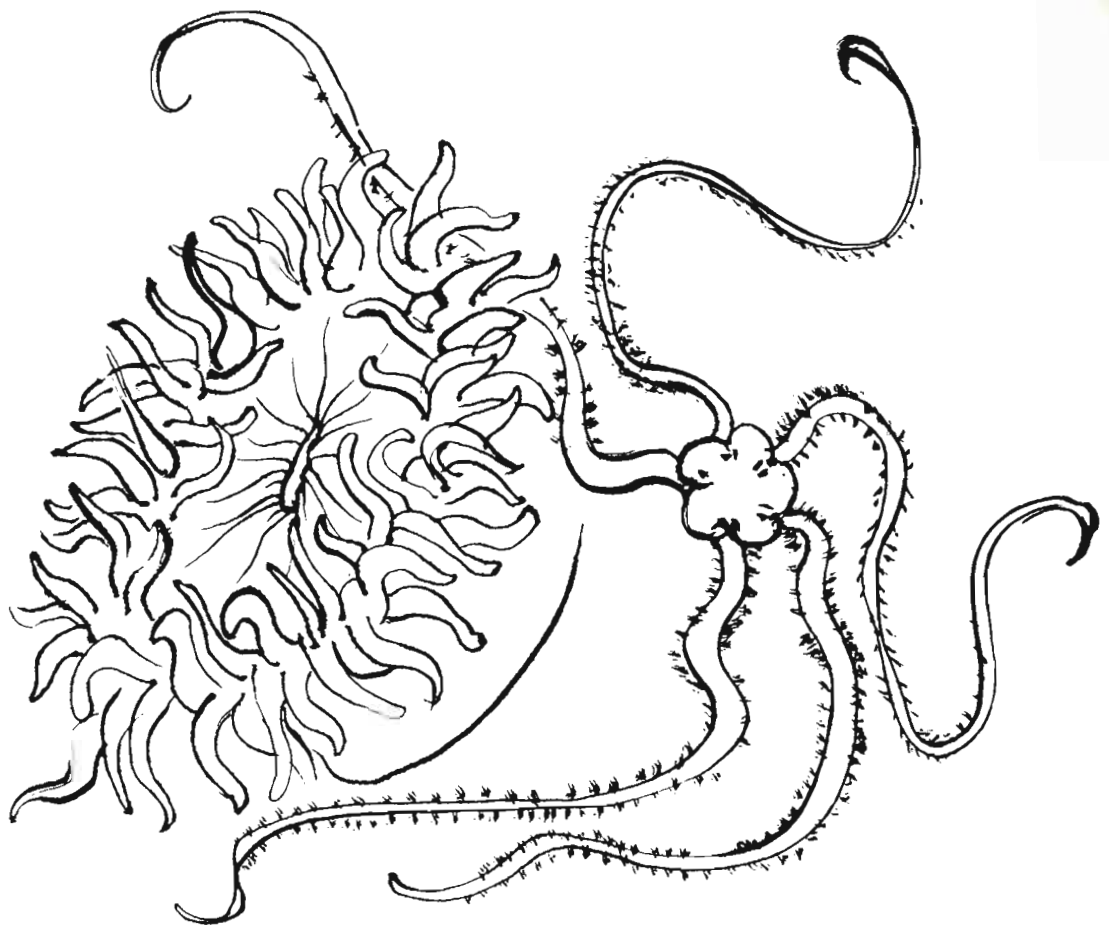




individualized
curriculum

e_2



Cover Art
The Art Class of Gordon Parker at Carmelo Summer School

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Washington, D.C. 20036

If the results are not surprising,
then one of us goofed.....signed "GOOOOIFY."

$$\begin{array}{r} 78 \\ 78 \\ + 78 \\ \hline 234 \end{array}$$

A.

$$\begin{array}{r} 74 \\ 74 \\ + 74 \\ \hline 222 \end{array}$$

B.

$$\begin{array}{r} 197 \\ 85 \\ + 60 \\ \hline 342 \end{array}$$

C.

$$\begin{array}{r} 198 \\ 76 \\ + 50 \\ \hline 324 \end{array}$$

D.

$$\begin{array}{r} 137 \\ 148 \\ + 159 \\ \hline 444 \end{array}$$

E.

$$\begin{array}{r} 42 \\ 6 \\ 78 \\ + 9 \\ \hline 135 \end{array}$$

F.

See: D&P 207-215

$$\begin{array}{r} 14 \\ 25 \\ 36 \\ 7 \\ + 8 \\ \hline 90 \end{array}$$

G.

$$\begin{array}{r} 37 \\ \times 21 \\ \hline \end{array}$$

777 H.

$$\begin{array}{r} 74 \\ \times 12 \\ \hline \end{array}$$

888 I.

$$\begin{array}{r} 27 \\ \times 37 \\ \hline \end{array}$$

999 A.

$$\begin{array}{r} 2500 \\ 1597 \\ 1597 \\ 1597 \\ + 1597 \\ \hline 8888 \end{array}$$

B.

Peculiar Pairs

$$\begin{array}{r} 46 \\ \times 32 \\ \hline \end{array}$$

1472 C.

$$\begin{array}{r} 64 \\ \times 23 \\ \hline \end{array}$$

1472 F.

$$\begin{array}{r} 86 \\ \times 34 \\ \hline \end{array}$$

2924 D.

$$\begin{array}{r} 68 \\ \times 43 \\ \hline \end{array}$$

2924 G.

$$\begin{array}{r} 253 \\ \times 64 \\ \hline \end{array}$$

16192 E.

$$\begin{array}{r} 352 \\ \times 46 \\ \hline \end{array}$$

16192 D.

$$\begin{array}{r} 52 \\ 63 \\ + 74 \\ \hline 189 \end{array}$$

B.

$$\begin{array}{r} 74 \\ 53 \\ + 62 \\ \hline 189 \end{array}$$

H.

$$\begin{array}{r} 48 \\ \times 6 \\ \hline 288 \end{array}$$

D.

$$\begin{array}{r} 32 \\ \times 9 \\ \hline 288 \end{array}$$

H.

	A.	B.	C.	D.
E.	444	8888	111	16192
F.	337	222	1472	135
G.	999	90	342	2924
H.	234	189	777	288
I.	1234	888	555	324

Pairs of Single-Digit Whole Number Factors

Rule: if not alike, please write the larger factor above the smaller factor.

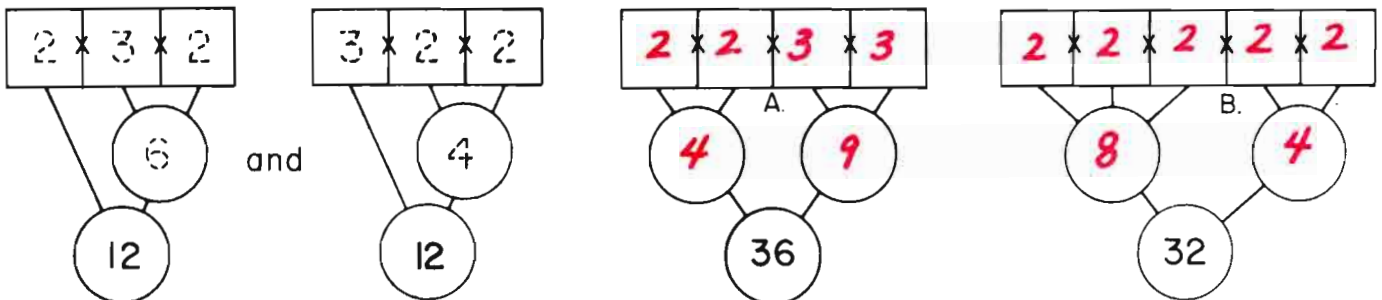
$\begin{array}{r} 3 \\ \times 2 \\ \hline 6 \end{array}$	$\begin{array}{r} 4 \text{ A.} \\ \times 2 \\ \hline 8 \end{array}$	$\begin{array}{r} 3 \text{ B.} \\ \times 3 \\ \hline 9 \end{array}$	$\begin{array}{r} 5 \text{ C.} \\ \times 2 \\ \hline 10 \end{array}$	$\begin{array}{r} 6 \text{ D.} \\ \times 2 \\ \hline 12 \end{array}$	$\begin{array}{r} 4 \text{ E.} \\ \times 3 \\ \hline 12 \end{array}$	$\begin{array}{r} 7 \text{ F.} \\ \times 2 \\ \hline 14 \end{array}$	$\begin{array}{r} 5 \text{ A.} \\ \times 3 \\ \hline 15 \end{array}$	$\begin{array}{r} 8 \text{ B.} \\ \times 2 \\ \hline 16 \end{array}$	$\begin{array}{r} 4 \text{ C.} \\ \times 4 \\ \hline 16 \end{array}$
$\begin{array}{r} 9 \text{ D.} \\ \times 2 \\ \hline 18 \end{array}$	$\begin{array}{r} 6 \text{ E.} \\ \times 3 \\ \hline 18 \end{array}$	$\begin{array}{r} 5 \text{ F.} \\ \times 4 \\ \hline 20 \end{array}$	$\begin{array}{r} 7 \\ \times 3 \\ \hline 21 \end{array}$	$\begin{array}{r} 8 \\ \times 3 \\ \hline 24 \end{array}$	$\begin{array}{r} 6 \text{ C.} \\ \times 4 \\ \hline 24 \end{array}$	$\begin{array}{r} 5 \\ \times 5 \\ \hline 25 \end{array}$	$\begin{array}{r} 9 \\ \times 3 \\ \hline 27 \end{array}$	$\begin{array}{r} 7 \\ \times 4 \\ \hline 28 \end{array}$	$\begin{array}{r} 6 \text{ E.} \\ \times 5 \\ \hline 30 \end{array}$
$\begin{array}{r} 8 \\ \times 4 \\ \hline 32 \end{array}$	$\begin{array}{r} 9 \\ \times 4 \\ \hline 36 \end{array}$	$\begin{array}{r} 6 \\ \times 6 \\ \hline 36 \end{array}$	$\begin{array}{r} 8 \\ \times 5 \\ \hline 40 \end{array}$	$\begin{array}{r} 7 \text{ E.} \\ \times 6 \\ \hline 42 \end{array}$	$\begin{array}{r} 9 \\ \times 5 \\ \hline 45 \end{array}$	$\begin{array}{r} 8 \text{ C.} \\ \times 6 \\ \hline 48 \end{array}$	$\begin{array}{r} 7 \text{ D.} \\ \times 7 \\ \hline 49 \end{array}$	$\begin{array}{r} 9 \\ \times 6 \\ \hline 54 \end{array}$	$\begin{array}{r} 8 \text{ F.} \\ \times 7 \\ \hline 56 \end{array}$

Taming frightfully big numbers . . .

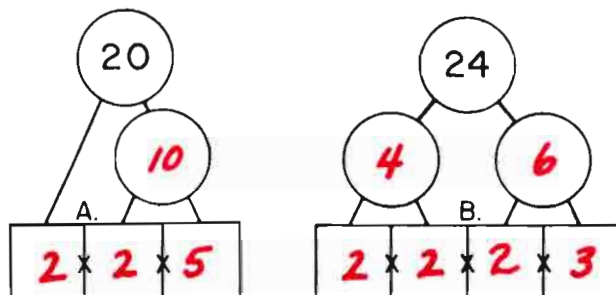
See: D&P 181-182

$\begin{array}{r} 1 \times 1 \\ \hline 1 \end{array}$	$\begin{array}{r} 3 \times 5 \\ \hline 15 \end{array}$	$\begin{array}{r} 6 \times 5 \\ \hline 30 \end{array}$
$\begin{array}{r} 10 \times 1 \\ \hline 10 \end{array}$	$\begin{array}{r} 30 \times 5 \\ \hline 150 \text{ A.} \end{array}$	$\begin{array}{r} 60 \times 5 \\ \hline 300 \text{ E.} \end{array}$
$\begin{array}{r} 1 \times 10 \\ \hline 10 \end{array}$	$\begin{array}{r} 3 \times 50 \\ \hline 150 \text{ K.} \end{array}$	$\begin{array}{r} 6 \times 50 \\ \hline 300 \text{ K.} \end{array}$
$\begin{array}{r} 10 \times 10 \\ \hline 100 \text{ B.} \end{array}$	$\begin{array}{r} 3 \times 500 \\ \hline 1500 \text{ D.} \end{array}$	$\begin{array}{r} 6 \times 500 \\ \hline 3000 \text{ F.} \end{array}$
$\begin{array}{r} 100 \times 10 \\ \hline 1000 \text{ C.} \end{array}$	$\begin{array}{r} 300 \times 5 \\ \hline 1500 \text{ I.} \end{array}$	$\begin{array}{r} 600 \times 5 \\ \hline 3000 \text{ G.} \end{array}$
$\begin{array}{r} 10 \times 100 \\ \hline 1000 \text{ J.} \end{array}$	$\begin{array}{r} 30 \times 50 \\ \hline 1500 \text{ D.} \end{array}$	$\begin{array}{r} 60 \times 50 \\ \hline 3000 \text{ F.} \end{array}$

Factor Trees (excluding 1 as a factor)

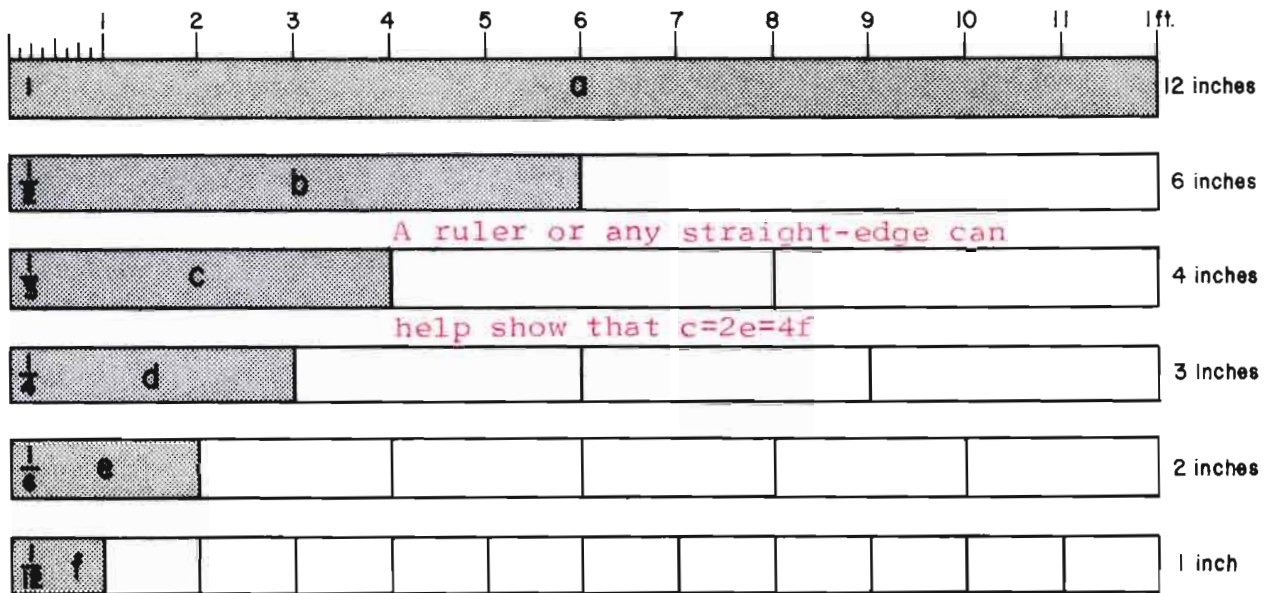


Prime factors can be in different orders, thus different solutions are possible.



	A.	B.	C.	D.	E.	F.
G	2,2,3,3	2,8	6,8	2,7	3,4	3,000
H	3,5	2,2,2,2,2	2,5	2,9	5,6	4,5
I	2,4	2,2,2,3	4,4	1500	3,6	2,7
J	2,2,5	3,3	1000	2,6	6,7	7,8
K	150	100	4,6	7,7	300	5,6

What Can You See? . . . (suggested by a 1 foot ruler)



A ruler or any straight-edge can help show that $c=2e=4f$

$$b + b = a$$

1/2

 $+$

1/2

 $=$

1

$$f + f = e$$

1/12

 $+$

1/12

 $=$

1/6

A. B.

$$d - e = f$$

1/4

 $-$

1/6

 $=$

1/12

C. G. F.

This is a sort of "double talk" - describing what you

$$b - c = e$$

1/2

 $-$

1/3

 $=$

1/6

D. A. B.

$$2e + 2f = b$$

2/6

 $+$

2/12

 $=$

1/2

$$3f - e = f$$

3/12

 $-$

1/6

 $=$

1/12

B. A.

see in 2 different ways - letters and fractions

$$a - c = 2c$$

1

 $-$

1/3

 $=$

2/3

$$a - d = 3d$$

1

 $-$

1/4

 $=$

3/4

B. C. D.

$$2c - 3f = 5f$$

2/3

 $-$

3/12

 $=$

5/12

C. A. B.

$$d \times 2 = b$$

1/4

 \times

2

 $=$

1/2

C. D.

$$f \times 3 = d \text{ or } 3f$$

1/12

 \times

3

 $=$

1/4

A. E.

$$b \div 2 = d$$

1/2

 \div

2

 $=$

1/4

D. E.

$$b \div 3 = e$$

1/2

 \div

3

 $=$

1/6

F. G.

	A.	B.	C.	D.
E.	1/3	5/12	1/4	1/5
F.	1/12	1	2/3	1/2
G.	3/12	1/6	3/8	3/4

From Easier $\xrightarrow{\text{to}}$ more Difficult

From Easier
 \downarrow to
 more Difficult

100%	50%	25%	10%	5%	3%	1½%
300	150 A.I	75 B.I	30 C.I	15 D.I	9 E.I	4½ A.
100	50 B.I	25 C.I	10 C.I	5 A.I	3 E.I	1½ A.
400	200 C.I	100 C.I	40 C.I	20 C.I	12 E.I	6 E.
200	100 D.I	50 D.I	20 C.I	10 C.I	6 E.I	3 E.

100%	50%	25%	75%	150%	15%	7½%
600	300 D.I	150 A.I	450 C.I	900 C.I	90 C.I	45 B.
200	100 D.I	50 B.I	150 A.I	300 D.I	30 C.I	15 D.
800	400 C.I	200 C.I	600 D.I	1200 D.I	120 E.I	60 E.
1000	500 B.I	250 B.I	750 B.I	1500 A.I	150 A.I	75 B.

See: D&P 77A-80F

2 (x4) 8 (x3) 24

26 (+9) 35 (-7) 28

24 (÷4) 6 (÷3) 2

26 (-7) 19 (+9) 28

8 (÷2) 4 (x5) 20

8 (x5) 40 (÷2) 20

	A.	B.	C.	D.	E.
F.	5	50	450	15	3
G.	150	750	200	1200	60
H.	4½	45	30	300	9
I.	1½	75	10	100	6

+ , - , × , ÷ Measurements:

7 days = 1 week

12 eggs = 1 dozen

$$\begin{array}{r|l} \text{wk. da.} & \\ \hline 1 & 3 \\ \hline + 1 & 4 \\ \hline \hline 3 & 0 \\ \hline \end{array} \quad \begin{array}{r|l} 10 & \text{da.} \\ \hline 11 & \text{da.} \\ \hline \hline 21 & \text{da.} \\ \hline \end{array}$$

WORK **CHECK**

$$\begin{array}{r|l} \text{wk. da.} & \\ \hline 2 & 3 & 0 & 7 \\ \hline - 1 & 4 & & \\ \hline \hline 1 & 3 & & \\ \hline \end{array} \quad \begin{array}{r|l} 21 & \text{da.} \\ \hline 11 & \text{da.} \\ \hline \hline 10 & \text{da.} \\ \hline \end{array}$$

B

$$\begin{array}{r|l} \text{wk. da.} & \\ \hline 1 & 4 \\ \hline \times 2 & \times 2 \\ \hline \hline 3 & 1 \\ \hline \end{array} \quad \begin{array}{r|l} & \text{da.} \\ \hline & \\ \hline \hline 22 & \text{da.} \\ \hline \end{array}$$

E

$$\begin{array}{r|l} \text{wk. da.} & \\ \hline 3 & 8 & 24 \\ \hline \div 4 & \div 4 \\ \hline \hline 6 & 6 \\ \hline \end{array} \quad \begin{array}{r|l} 24 & \text{da.} \\ \hline & \\ \hline \hline 6 & \text{da.} \\ \hline \end{array}$$

H
(LEFT TO RIGHT)

$$\begin{array}{r|l} \text{wk. da.} & \\ \hline 2 & 5 \\ \hline + 1 & 6 \\ \hline \hline 4 & 4 \\ \hline \end{array} \quad \begin{array}{r|l} 19 & \text{da.} \\ \hline 13 & \text{da.} \\ \hline \hline 32 & \text{da.} \\ \hline \end{array}$$

C

$$\begin{array}{r|l} \text{doz. eggs} & \\ \hline 2 & 3 \\ \hline + 1 & 10 \\ \hline \hline 4 & 1 \\ \hline \end{array} \quad \begin{array}{r|l} 27 & \text{eggs} \\ \hline 22 & \text{e.} \\ \hline \hline 49 & \text{e.} \\ \hline \end{array}$$

WORK **CHECK**

$$\begin{array}{r|l} \text{doz. eggs} & \\ \hline 3 & 4 & 13 \\ \hline - 1 & 10 & \\ \hline \hline 2 & 3 & \\ \hline \end{array} \quad \begin{array}{r|l} 49 & \text{e.} \\ \hline 22 & \text{e.} \\ \hline \hline 27 & \text{e.} \\ \hline \end{array}$$

C

$$\begin{array}{r|l} \text{doz. eggs} & \\ \hline 0 & 8 \\ \hline \times 3 & \times 3 \\ \hline \hline 2 & 0 \\ \hline \end{array} \quad \begin{array}{r|l} 8 & \text{e.} \\ \hline & \\ \hline \hline 24 & \text{e.} \\ \hline \end{array}$$

F

$$\begin{array}{r|l} \text{doz. eggs} & \\ \hline 1 & 8 & 20 \\ \hline \div 5 & \div 5 \\ \hline \hline 4 & 4 \\ \hline \end{array} \quad \begin{array}{r|l} 20 & \text{e.} \\ \hline & \\ \hline \hline 4 & \text{e.} \\ \hline \end{array}$$

A
(LEFT TO RIGHT)

$$\begin{array}{r|l} \text{doz. eggs} & \\ \hline 2 & 3 & 12 \\ \hline - 1 & 7 & \\ \hline \hline 1 & 5 & \\ \hline \end{array} \quad \begin{array}{r|l} 36 & \text{e.} \\ \hline 19 & \text{e.} \\ \hline \hline 17 & \text{e.} \\ \hline \end{array}$$

D

$$\begin{array}{r|l} \$10 & \$1 \\ \hline 1 & 7 \\ \hline + 1 & 7 \\ \hline \hline 3 & 4 \\ \hline \end{array} \quad \begin{array}{r|l} & \\ \hline & \\ \hline \hline 34 & \\ \hline \end{array}$$

A
WORK **CHECK**
(THE SAME!)

$$\begin{array}{r|l} \text{10¢} & \text{1¢} \\ \hline 3 & 4 & 1 \\ \hline - 1 & 8 & \\ \hline \hline 2 & 2 & \\ \hline \end{array} \quad \begin{array}{r|l} & \\ \hline & \\ \hline \hline 40 & \text{¢} \\ \hline 18 & \text{¢} \\ \hline \hline 22 & \text{¢} \\ \hline \end{array}$$

D

1 decimeter = 10 centimeters

$$\begin{array}{r|l} \text{dm. cm.} & \\ \hline 1 & 5 \\ \hline \times 2 & \times 2 \\ \hline \hline 3 & 0 \\ \hline \end{array} \quad \begin{array}{r|l} & \text{cm.} \\ \hline & \\ \hline \hline 30 & \text{cm.} \\ \hline \end{array}$$

G

$$\begin{array}{r|l} 10\text{'s} & 1\text{'s} \\ \hline 2 & 3 & 0 \\ \hline \div 2 & \div 2 \\ \hline \hline 1 & 5 \\ \hline \end{array} \quad \begin{array}{r|l} & \\ \hline & \\ \hline \hline 30 & (1\text{'s}) \\ \hline 15 & (1\text{'s}) \\ \hline \end{array}$$

B

	A	B	C	D	E
F	1,1	2,0	2,3	3,3	4,4
G	3,4	1,5	3,0	1,5	3,1
H	0,4	1,3	4,4	2,2	0,6

Estimation

. . . or "coming close" . . . with easier arithmetic.

$9 \times 7 = 63$

+1	+0
-1	+1
+1	-1

→

$10 \times 7 = 70$	(+7)
$8 \times 8 = 64$	A. (+1)
$10 \times 6 = 60$	B. (-3)

How close?
Getting an exact result

$$\begin{array}{r} 9 \\ \times 7 \\ \hline 63 \end{array}$$

x "closest"

$8 \times 13 = 104$

+3	-3
+2	-3
+2	-2

→

$11 \times 10 = 110$	c. (+6)
$10 \times 10 = 100$	(-4) A.
$10 \times 11 = 110$	(+6)

$$\begin{array}{r} 13 \\ \times 8 \\ \hline 104 \end{array}$$

$12 \times 23 = 276$

+3	-3
-1	+2
-2	+4

→

$15 \times 20 = 300$	D. (+24) C.
$11 \times 25 = 275$	(-1) X
$10 \times 27 = 270$	A. (-6) D.

$$\begin{array}{r} 23 \\ \times 12 \\ \hline 276 \end{array}$$

$7 \times 11 = 77$

+1	-2
+1	-1
+2	-2
-2	+3
-1	+2
-3	+8

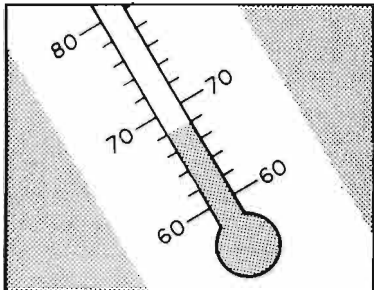
→

$8 \times 9 = 72$	B. (-5)
$8 \times 10 = 80$	C. (+3)
$9 \times 9 = 81$	D. (+4) E.
$5 \times 14 = 70$	A. (-7) B.
$6 \times 13 = 78$	(+1) C.
$4 \times 19 = 76$	(-1) D.

Getting an exact result

$$\begin{array}{r} 11 \\ \times 7 \\ \hline 77 \end{array}$$

	A.	B.	C.	D.
E.	70	72	111	-6
F.	64	-7	80	-1
G.	-4	60	+1	81
H.	270	70	+24	300



temperature shown

68 °

A.

17° higher

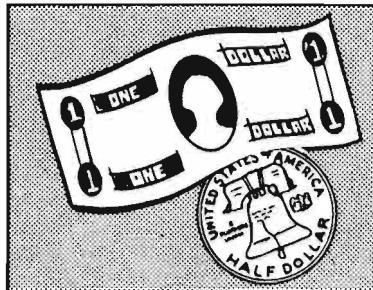
85 °

B.

39° lower

29 °

C.



amount shown

\$ 1.50

D.

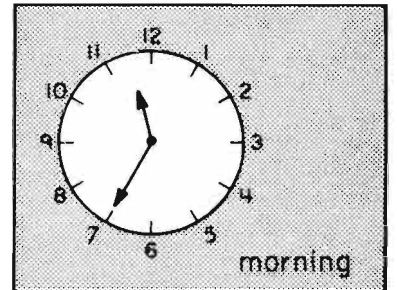
3 times as much

\$ 4.50

E.

one third as much

\$.50



time shown

11 : 35 a.m.

G.

1½ hours later

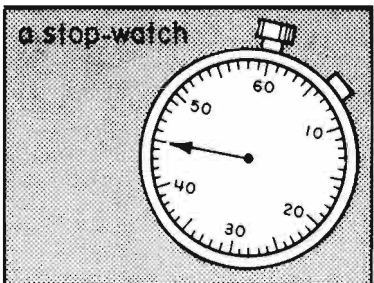
1 : 05

H.

1¼ hours earlier

10 : 20

I.



time shown (less than 1 minute)

0 min., 45 sec.

A.

twice as long

1 min., 30 sec.

B.

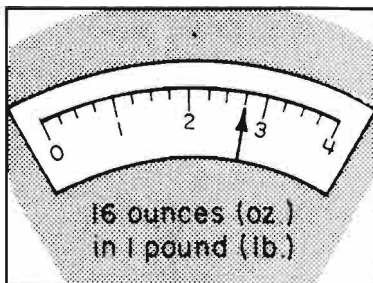
one third as long

 min., 15 sec.

C.

½ minute longer

1 min., 15 sec.



amount shown

2 lb., 12 oz.

E.

half as much

1 lb., 6 oz.

F.

7 ounces more

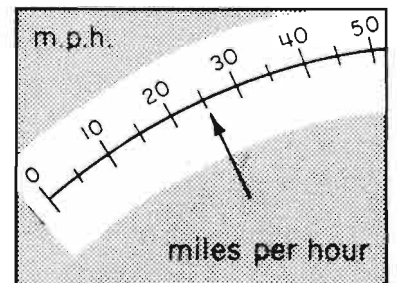
3 lb., 3 oz.

G.

14 ounces less

1 lb., 14 oz.

H.



speed shown

25 m.p.h.

A.

17 m.p.h. faster

42 m.p.h.

E.

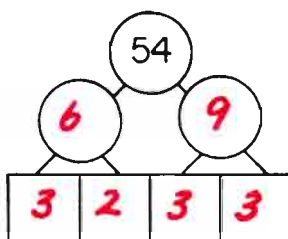
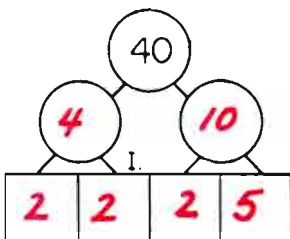
twice as fast

50 m.p.h.

half as fast

12½ m.p.h.

I.



	A.	B.	C.	D.	E.
F.	25	1,30	1,6	1.50	2,12
G.	68	11:35	0,15	3,3	42
H.	0,45	85	1:05	1,14	4.50
I.	2,2 2,5	2,3 3,3	29	10:20	12½

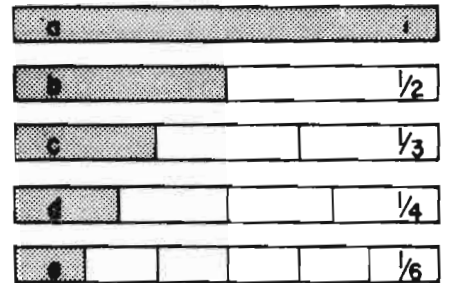
On Your Own (I)

$$\begin{array}{r} 37 \\ 37 \\ 37 \\ + 37 \\ \hline 148 \end{array}$$

$$\begin{array}{r} 100 \\ - 37 \\ \hline 63 \end{array}$$

$$\begin{array}{r} 37 \\ \times 12 \\ \hline 444 \end{array}$$

$$\begin{array}{r} 23 \\ \times 46 \\ \hline 1058 \end{array}$$



Please circle the letter after the line you think will be the best "estimate."

$$\boxed{12 \times 12} = 144$$

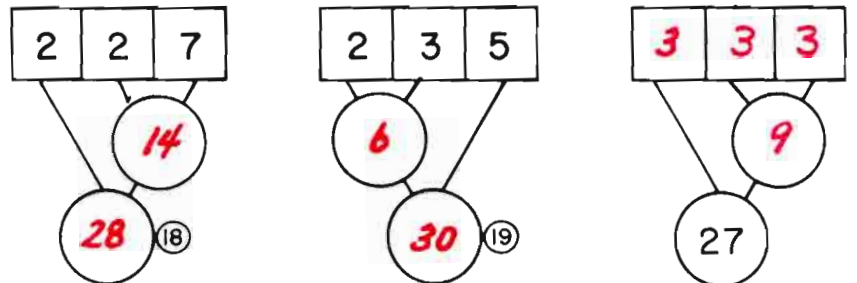
$$\begin{array}{r} 10 \times 10 \quad \text{A.} = 100 \\ 10 \times 15 \quad \text{B.} = 150 \\ 10 \times 20 \quad \text{C.} = 200 \end{array}$$

$$\boxed{15 \times 15} = 225$$

$$\begin{array}{r} 10 \times 10 \quad \text{D.} = 100 \\ 10 \times 20 \quad \text{E.} = 200 \\ 20 \times 20 \quad \text{F.} = 400 \end{array}$$

$$\begin{array}{r} a - 3d = \frac{d}{4} \\ \vdots - \frac{3}{4} = \frac{1}{4} \\ b + d = \frac{3d}{4} \\ \frac{1}{2} + \frac{1}{4} = \frac{3}{4} \\ 2c - e = \frac{3e \text{ or } b}{6} \\ \frac{2}{3} - \frac{1}{6} = \frac{3}{6} \text{ or } \frac{1}{2} \end{array}$$

$$\begin{array}{r} 2 \times 5 = 10 \\ 10 \times 5 = 50 \\ 5 \times 20 = 100 \\ 10 \times 20 = 200 \\ 10 \times 50 = 500 \\ 20 \times 50 = 1,000 \\ 2 \times 500 = 1,000 \\ 10 \times 500 = 5,000 \end{array}$$



100%	50%	25%	10%	5%
60	30	15	6	3
100	50	25	10	5
50	25	12.5	5	2.5

1 doz. = 12 eggs

doz.	eggs	
2	4	28 e.
+	11	23 e.
3	15	51 e.

doz.	eggs	
3	3	39 e.
-	10	22 e.
1	5	17 e.



How do you feel?

If the results aren't interesting,
then one of us goofed! . . . signed "GOOOOOFY"

$$\begin{array}{r} 321 \\ 4 \overline{)1284} \end{array}$$

A.

$$\begin{array}{r} 222 \\ 7 \overline{)1554} \end{array}$$

B.

$$\begin{array}{r} 57 \\ 6 \overline{)342} \end{array}$$

C.

$$\begin{array}{r} 444 \\ 4 \overline{)1776} \end{array}$$

A.

$$\begin{array}{r} 24 \\ 15 \overline{)360} \end{array}$$

B.

$$\begin{array}{r} 13 \\ 13 \overline{)169} \end{array}$$

C.

$$\begin{array}{r} 34 \\ 12 \overline{)408} \end{array}$$

A.

$$\begin{array}{r} 111 \\ 23 \overline{)2553} \end{array}$$

B.

See: D&P 216-221

$$\begin{array}{r} 2599 \\ 2589 \\ + 2589 \\ \hline 7777 \end{array}$$

C.

$$\begin{array}{r} 123 \\ 12 \overline{)1476} \end{array}$$

A.

$$\begin{array}{r} 874 \\ 874 \\ 474 \\ 474 \\ 874 \\ + 874 \\ \hline 4444 \end{array}$$

B.

$$\begin{array}{r} 345 \\ 12 \overline{)4140} \end{array}$$

C.

$$\begin{array}{r} 789 \\ 889 \\ 889 \\ + 889 \\ \hline 3456 \end{array}$$

A.

$$\begin{array}{r} 21 \\ 43 \overline{)903} \end{array}$$

B.

$$\begin{array}{r} 34 \\ 52 \overline{)1768} \end{array}$$

C.

A.	B.	C.
444	21	57
34	222	345
3456	111	13
123	24	34
321	4444	7777

Pairs of Single-Digit Whole Number Factors.

Rule: if not alike, please write the larger factor above the smaller factor.

$\begin{array}{r} \times 5 \\ \underline{2} \\ 10 \end{array}$ A.	$\begin{array}{r} \times 6 \\ \underline{2} \\ 12 \end{array}$ B.	$\begin{array}{r} \times 7 \\ \underline{2} \\ 14 \end{array}$ C.	$\begin{array}{r} \times 8 \\ \underline{2} \\ 16 \end{array}$ D.	$\begin{array}{r} \times 9 \\ \underline{2} \\ 18 \end{array}$ E.	$\begin{array}{r} \times 5 \\ \underline{3} \\ 15 \end{array}$ F.	$\begin{array}{r} \times 6 \\ \underline{3} \\ 18 \end{array}$ G.	$\begin{array}{r} \times 7 \\ \underline{3} \\ 21 \end{array}$ H.	$\begin{array}{r} \times 8 \\ \underline{3} \\ 24 \end{array}$ I.	$\begin{array}{r} \times 9 \\ \underline{3} \\ 27 \end{array}$ J.
$\begin{array}{r} \times 5 \\ \underline{4} \\ 20 \end{array}$ K.	$\begin{array}{r} \times 6 \\ \underline{4} \\ 24 \end{array}$	$\begin{array}{r} \times 7 \\ \underline{4} \\ 28 \end{array}$	$\begin{array}{r} \times 8 \\ \underline{4} \\ 32 \end{array}$	$\begin{array}{r} \times 9 \\ \underline{4} \\ 36 \end{array}$	$\begin{array}{r} \times 5 \\ \underline{5} \\ 25 \end{array}$	$\begin{array}{r} \times 6 \\ \underline{5} \\ 30 \end{array}$	$\begin{array}{r} \times 7 \\ \underline{5} \\ 35 \end{array}$	$\begin{array}{r} \times 8 \\ \underline{5} \\ 40 \end{array}$	$\begin{array}{r} \times 9 \\ \underline{5} \\ 45 \end{array}$
$\begin{array}{r} \times 6 \\ \underline{6} \\ 36 \end{array}$	$\begin{array}{r} \times 7 \\ \underline{6} \\ 42 \end{array}$	$\begin{array}{r} \times 8 \\ \underline{6} \\ 48 \end{array}$ A.	$\begin{array}{r} \times 9 \\ \underline{6} \\ 54 \end{array}$ D.	$\begin{array}{r} \times 7 \\ \underline{7} \\ 49 \end{array}$ F.	$\begin{array}{r} \times 8 \\ \underline{7} \\ 56 \end{array}$ G.	$\begin{array}{r} \times 9 \\ \underline{7} \\ 63 \end{array}$ H.	$\begin{array}{r} \times 8 \\ \underline{8} \\ 64 \end{array}$ I.	$\begin{array}{r} \times 9 \\ \underline{8} \\ 72 \end{array}$ J.	$\begin{array}{r} \times 9 \\ \underline{9} \\ 81 \end{array}$ K.

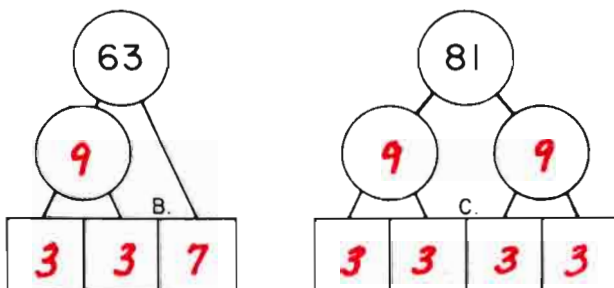
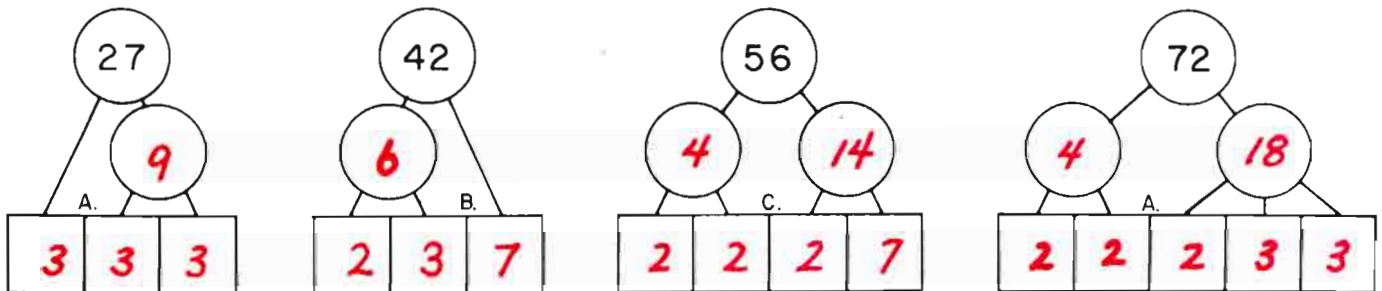
Taming frightfully big numbers . . .

See: D&P 181-182

$2 \times 5 = 10$	$8 \times 9 = 72$	$2 \times 12 = 24$
$2 \times 50 = 100$	$8 \times 90 = 720$ K	$20 \times 12 = 240$ F.
$20 \times 5 = 100$	$80 \times 9 = 720$ D.	$2 \times 120 = 240$ I.
$2 \times 500 = 1000$	$80 \times 90 = 7200$ E.	$20 \times 120 = 2400$ A.
$20 \times 500 = 10,000$	$8 \times 900 = 7200$ J.	$2 \times 1200 = 2400$ G.
$200 \times 500 = 100,000$ F.	$800 \times 9 = 7200$ E.	$200 \times 12 = 2400$ A.

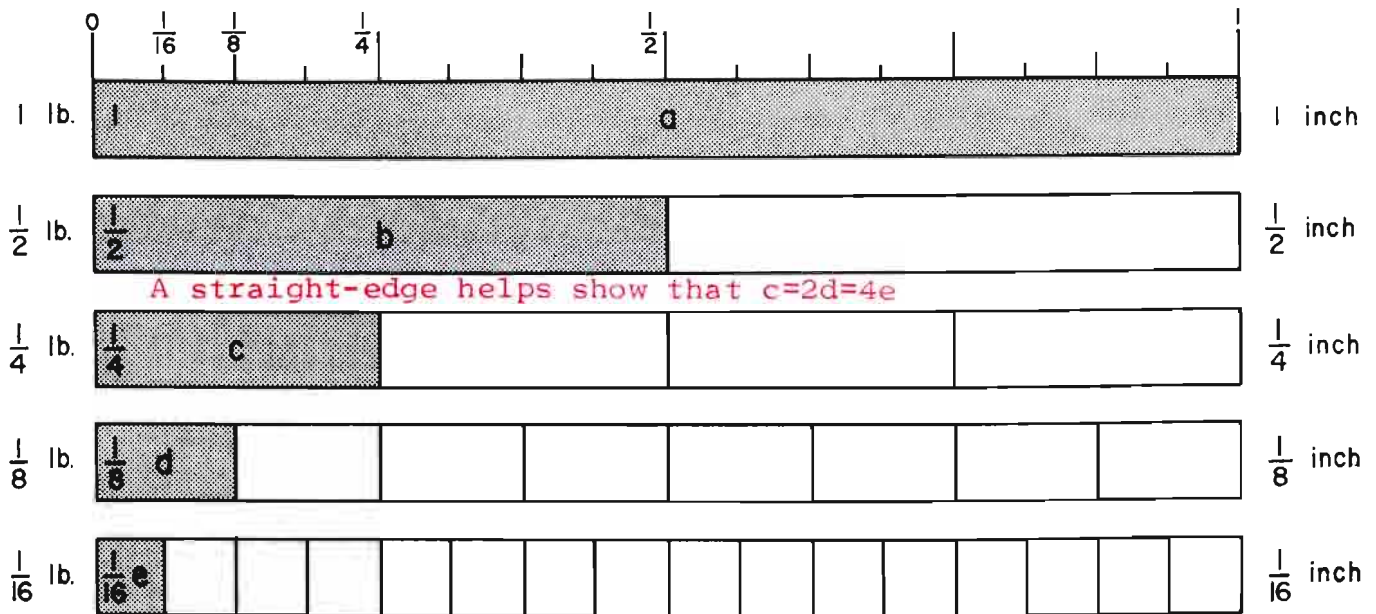
Factor Trees (excluding 1 as a factor)

See: D&P 177-180



	A	B	C	D	E	F
G.	2400	3,3,7	2,7	3,6	7,8	100,000
H.	3,3,3	2,6	7,9	3,7	2,9	7,7
I.	2,5	8,8	2,2,2,7	6,9	3,8	240
J.	6,8	2,3,7	3,9	2,8	7200	8,9
K.	2,2,2,3,3	9,9	3,3,3,3	720	4,5	3,5

What Can You See? . . . (suggested by a pound of butter or 1 inch)



$$\frac{c + c}{\frac{1}{4} + \frac{1}{4}} = \frac{b}{\frac{1}{2}}$$

$$\frac{b + b}{\frac{1}{2} + \frac{1}{2}} = \frac{a}{1}$$

$$\frac{a - 3c}{1 - \frac{3}{4}} = \frac{c}{\frac{1}{4}}$$

$$\frac{3d + 2e}{\frac{3}{8} + \frac{2}{16}} = \frac{b}{\frac{1}{2}}$$

$$\frac{b - c}{\frac{1}{2} - \frac{1}{4}} = \frac{c}{\frac{1}{4}}$$

$$\frac{2d - e}{\frac{2}{8} - \frac{1}{16}} = \frac{3e}{\frac{3}{16}}$$

$$\frac{b - d}{\frac{1}{2} - \frac{1}{8}} = \frac{3d}{\frac{3}{8}}$$

$$\frac{d - e}{\frac{1}{8} - \frac{1}{16}} = \frac{e}{\frac{1}{16}}$$

$$\frac{c + 3e}{\frac{1}{4} + \frac{3}{16}} = \frac{7e}{\frac{7}{16}}$$

$$\frac{3c - b}{\frac{3}{4} - \frac{1}{2}} = \frac{c}{\frac{1}{4}}$$

$$\frac{7d - c}{\frac{7}{8} - \frac{1}{4}} = \frac{5d}{\frac{5}{8}}$$

$$\frac{5d + c}{\frac{5}{8} + \frac{1}{4}} = \frac{7d}{\frac{7}{8}}$$

$$\frac{c \times 2}{\frac{1}{4} \times 2} = \frac{b}{\frac{1}{2}}$$

$$\frac{3e \times 3}{\frac{3}{16} \times 3} = \frac{9e}{\frac{9}{16}}$$

	A.	B.	C.	D.
E.	$\frac{1}{8}$	$\frac{5}{8}$	$\frac{1}{16}$	$\frac{1}{2}$
F.	$\frac{3}{16}$	$\frac{9}{16}$	$\frac{1}{4}$	$\frac{3}{8}$
G.	$\frac{1}{2}$	$\frac{2}{8}$	$\frac{7}{8}$	$\frac{3}{4}$

$$\frac{3c \div 3}{\frac{3}{4} \div 3} = \frac{c}{\frac{1}{4}}$$

$$\frac{2c \div 4}{\frac{2}{4} \div 4} = \frac{d}{\frac{1}{8}}$$

From Easier $\xrightarrow{\text{to}}$ more Difficult

From Easier
↓
to
more Difficult

100 %	50 %	25 %	75 %	10 %	5 %	2½ %
\$ 10.00	\$ 5.00	\$ 2.50	\$ 7.50	\$ 1.00	\$.50	\$.25
\$ 50.00	\$ 25.00	\$ 12.50	\$ 37.50 _{A,I}	\$ 5.00 _{B,I}	\$ 2.50 _{C,I}	\$ 1.25
\$ 100.00	\$ 50.00 _{D,I}	\$ 25.00 _{A,I}	\$ 75.00 _{E,I}	\$ 10.00 _{C,I}	\$ 5.00 _{B,I}	\$ 2.50 _{C,I}
\$ 150.00	\$ 75.00 _{E,I}	\$ 37.50	\$ 112.50 _{B,I}	\$ 15.00	\$ 7.50	\$ 3.75

100 %	50 %	150 %	25 %	125 %	200 %	250 %
\$ 100.00	\$ 50.00	\$ 150.00	\$ 25.00 _{A,I}	\$ 125.00 _{H,I}	\$ 200.00 _{C,I}	\$ 250.00 _{D,I}
\$ 25.00	\$ 12.50	\$ 37.50 _{A,I}	\$ 6.25 _{B,I}	\$ 31.25 _{C,I}	\$ 50.00 _{D,I}	\$ 62.50
\$ 75.00	\$ 37.50 _{A,I}	\$ 112.50 _{B,I}	\$ 18.75	\$ 93.75	\$ 150.00	\$ 187.50 _{A,I}
\$ 175.00	\$ 87.50	\$ 262.50	\$ 43.75 _{E,I}	\$ 218.75	\$ 350.00	\$ 437.50 _{A,I}

Short CHAIN REACTIONS

$$\frac{7 (+8) \quad \mathbf{15} (+5) \quad \mathbf{20}}{\text{F} \qquad \qquad \text{G}}$$

$$\frac{2 (x3) \quad \mathbf{6} (x4) \quad \mathbf{24}}{\text{H} \qquad \qquad \text{I}}$$

$$\frac{20 (-8) \quad \mathbf{12} (-5) \quad \mathbf{7}}{\text{J} \qquad \qquad \text{K}}$$

$$\frac{24 (\div 3) \quad \mathbf{8} (\div 4) \quad \mathbf{2}}{\text{L} \qquad \qquad \text{M}}$$

$$\frac{7 (+5) \quad \mathbf{12} (+8) \quad \mathbf{20}}{\text{N} \qquad \qquad \text{O}}$$

$$\frac{20 (-5) \quad \mathbf{15} (-8) \quad \mathbf{7}}{\text{P} \qquad \qquad \text{Q}}$$

	A.	B.	C.	D.	E.
F.	18750	625	250	15	43.75
G.	37.50	20	31.25	250.00	75.00
H.	25.00	5.00	10.00	7	125.00
I.	437.50	112.50	200.00	50.00	12

$+$, $-$, \times , \div Measurements

1 foot = 12 inches

1 nickel = 5 pennies

$$\begin{array}{r|l} \text{ft.} & \text{in.} \\ \hline 1 & 11 \\ \hline + 0 & 9 \\ \hline 2 & 8 \\ \hline \end{array} \quad \begin{array}{l} 23 \text{ in.} \\ 9 \text{ in.} \\ \hline 32 \text{ in.} \\ \hline \end{array}$$

WORK **CHECK**

$$\begin{array}{r|l} \text{ft.} & \text{in.} \\ \hline 2 & 0^{12} \\ \hline - 1 & 8 \\ \hline 1 & 4 \\ \hline \end{array} \quad \begin{array}{l} 36 \text{ in.} \\ 20 \text{ in.} \\ \hline 16 \text{ in.} \\ \hline \end{array}$$

D.

$$\begin{array}{r|l} \text{ft.} & \text{in.} \\ \hline 1 & 6 \\ \hline \times 2 & \times 2 \\ \hline 3 & 0 \\ \hline \end{array} \quad \begin{array}{l} 18 \text{ in.} \\ \hline 36 \text{ in.} \\ \hline \end{array}$$

G.

$$\begin{array}{r|l} \text{ft.} & \text{in.} \\ \hline 3 & 0^{36} \\ \hline \div 4 & \div 4 \\ \hline 9 & 9 \\ \hline \end{array} \quad \begin{array}{l} 36 \text{ in.} \\ \hline 9 \text{ in.} \\ \hline \end{array}$$

B. **(LEFT TO RIGHT)**

$$\begin{array}{r|l} \text{ft.} & \text{in.} \\ \hline 2 & 11 \\ \hline + 2 & 11 \\ \hline 5 & 10 \\ \hline \end{array} \quad \begin{array}{l} 35 \text{ in.} \\ 35 \text{ in.} \\ \hline 70 \text{ in.} \\ \hline \end{array}$$

F.

$$\begin{array}{r|l} \text{5¢} & \text{1¢} \\ \hline 2 & 2 \\ \hline + 1 & 3 \\ \hline 4 & 0 \\ \hline \end{array} \quad \begin{array}{l} 12 \text{ ¢} \\ 8 \text{ ¢} \\ \hline 20 \text{ ¢} \\ \hline \end{array}$$

B. **WORK** **CHECK**

$$\begin{array}{r|l} \text{5¢} & \text{1¢} \\ \hline 3 & 5 \\ \hline - 0 & 4 \\ \hline 3 & 1 \\ \hline \end{array} \quad \begin{array}{l} 20 \text{ ¢} \\ 4 \text{ ¢} \\ \hline 16 \text{ ¢} \\ \hline \end{array}$$

E.

$$\begin{array}{r|l} \text{5¢} & \text{1¢} \\ \hline 2 & 1 \\ \hline \times 4 & \times 4 \\ \hline 6 & 2 \\ \hline \end{array} \quad \begin{array}{l} 8 \text{ ¢} \\ \hline 32 \text{ ¢} \\ \hline \end{array}$$

H.

$$\begin{array}{r|l} \text{5¢} & \text{1¢} \\ \hline 4 & 1^6 \\ \hline \div 3 & \div 3 \\ \hline 1 & 2 \\ \hline \end{array} \quad \begin{array}{l} 21 \text{ ¢} \\ \hline 7 \text{ ¢} \\ \hline \end{array}$$

C. **(LEFT TO RIGHT)**

$$\begin{array}{r|l} \text{5¢} & \text{1¢} \\ \hline 2 & 3 \\ \hline - 1 & 2 \\ \hline 1 & 4 \\ \hline \end{array} \quad \begin{array}{l} 16 \text{ ¢} \\ 7 \text{ ¢} \\ \hline 9 \text{ ¢} \\ \hline \end{array}$$

G.

$$\begin{array}{r|l} \text{\$10} & \text{\$1} \\ \hline 6 & 8 \\ \hline + 2 & 9 \\ \hline 9 & 7 \\ \hline \end{array} \quad \begin{array}{l} \$68 \\ \$29 \\ \hline \$97 \\ \hline \end{array}$$

C. **WORK** **CHECK**
(THE SAME!)

$$\begin{array}{r|l} \text{10¢} & \text{1¢} \\ \hline 6 & 1 \\ \hline - 3 & 8 \\ \hline 3 & 3 \\ \hline \end{array} \quad \begin{array}{l} 71 \text{ ¢} \\ 38 \text{ ¢} \\ \hline 33 \text{ ¢} \\ \hline \end{array}$$

F.

1 decimeter = 10 centimeters

$$\begin{array}{r|l} \text{dm.} & \text{cm.} \\ \hline 4 & 9 \\ \hline \times 5 & \times 5 \\ \hline 9 & 5 \\ \hline \end{array} \quad \begin{array}{l} 19 \text{ cm.} \\ \hline 95 \text{ cm.} \\ \hline \end{array}$$

A.

See: D&P 156-165

$$\begin{array}{r|l} \text{10's} & \text{1's} \\ \hline 5 & 1 \\ \hline \div 3 & \div 3 \\ \hline 1 & 7 \\ \hline \end{array} \quad \begin{array}{l} 51 \text{ (1's)} \\ \hline 17 \text{ (1's)} \\ \hline \end{array}$$

E.

	A	B	C	D	E
F.	6,0	0,9	9,7	3,3	5,10
G.	2,10	1,4	3,0	1,4	1,7
H.	9,5	4,0	1,2	6,2	3,1

Estimation . . . or "coming close" . . . with easier arithmetic.

Getting an exact result

$384 \div 16 = 24$

-84	+4	→	$300 \div 20 = 15$	(-9) A.
+16	+4	→	$400 \div 20 = 20$	(-4) B.
+66	-1	→	$450 \div 15 = 30$	(+6) C.

(How close?)

$16 \overline{)384}^{24}$ D.

$676 \div 13 = 52$

-76	-3	→	$600 \div 10 = 60$	(+8) A.
-76	+2	→	$600 \div 15 = 40$	(-12) B.
-76	-1	→	$600 \div 12 = 50$	(-2) C.

$13 \overline{)676}^{52}$ D.

$342 \div 19 = 18$

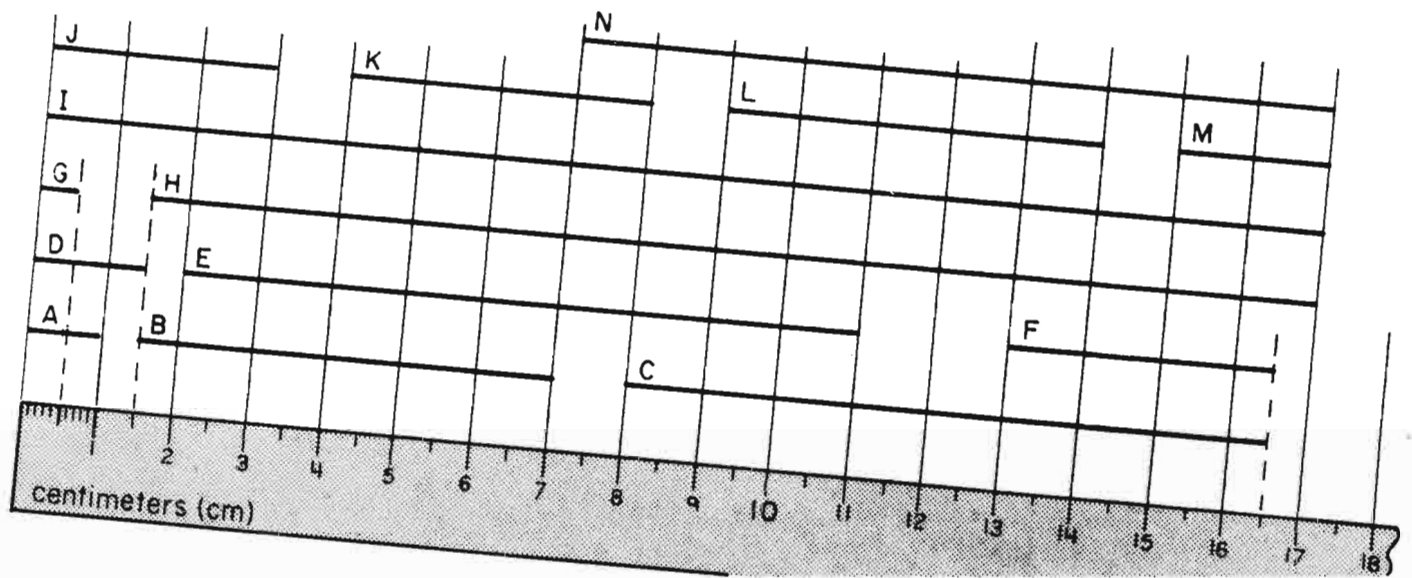
		→	$\div =$	()
		→	$\div =$	()
		→	$\div =$	()

$19 \overline{)342}^{18}$ D.

Taming frightfully big numbers . . .

$1 \times 7 = 7$	$2 \times 5 = 10$	$10 \times 80 = 800$ F.
$10 \times 7 = 70$ A.	$20 \times 5 = 100$ D.	$40 \times 50 = 2000$ B.
$7 \times 10 = 70$ E.	$5 \times 20 = 100$ E.	
$10 \times 70 = 700$ C.	$20 \times 50 = 1000$ C.	
$70 \times 10 = 700$ E.	$50 \times 20 = 1000$ H.	
$700 \times 1 = 700$ C.	$500 \times 2 = 1000$ C.	
$1 \times 700 = 700$ E.	$2 \times 500 = 1000$ H.	

	A.	B.	C.	D.
E.	70	-12	700	100
F.	-9	800	-2	24
G.	+7	2000	+6	18
H.	+8	-4	1000	52



Lengths of lines shown

A: 1 cm.

H: 15.5 cm.

B: 5.5 cm.

I: 17 cm.

C: 8.5 cm.

J: 3 cm.

D: 1.5 cm.

K: 4 cm.

E: 9 cm.

L: 5 cm.

F: 3.5 cm.

M: 2 cm.

G: .5 cm.

N: 10 cm.

Sums of lengths

A and B: 6.5 cm.

C and D: 10 cm.

E and F: 12.5 cm.

G and H: 16 cm.

I and B: 22.5 cm.

C and H: 24 cm.

G and N: 10.5 cm.

Differences of lengths

A and B: 4.5 cm.

C and D: 7 cm.

E and F: 5.5 cm.

G and N: 9.5 cm.

H and I: 1.5 cm.

I and C: 8.5 cm.

D and N: 8.5 cm.

Taming frightfully big numbers . . .

$10 \times 10 = \underline{100}$ H. $1000 \div 2 = \underline{500}$ A.

$20 \times 10 = \underline{200}$ H. $1000 \div 4 = \underline{250}$ A.

$20 \times 50 = \underline{1000}$ H. $1000 \div 8 = \underline{125}$ D.

$200 \times 20 = \underline{4000}$ C. $1000 \div 20 = \underline{50}$ B.

$200 \times 50 = \underline{10,000}$ C. $1000 \div 40 = \underline{25}$ D.

$200 \times 500 = \underline{100,000}$ A. $1000 \div 80 = \underline{12\frac{1}{2}}$ F.

	A.	B.	C.	D.	E.	F.
G.	500	24	17	7	16	15.5
H.	100	5	5.5	3	10.5	11
I.	1	10	4000	9	9.5	4
J.	100,000	50	1.5	125	8	22.5
K.	2	8.5	6.5	12.5	3.5	12½

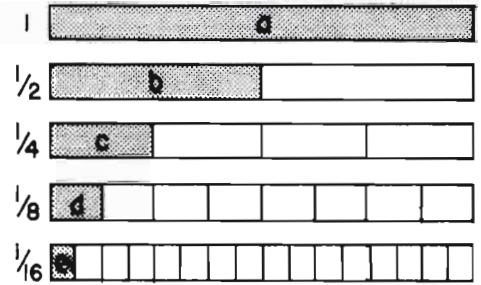
On Your Own (II)

$$\begin{array}{r} 185 \\ 185 \\ + 185 \\ \hline 555 \end{array}$$

$$5 \overline{)215} \quad \begin{array}{r} 43 \\ 5 \overline{)215} \end{array}$$

$$23 \overline{)1035} \quad \begin{array}{r} 45 \\ 23 \overline{)1035} \end{array}$$

$$3 \times \$1.50 = \$4.50$$



Please circle the letter after the line you think will be the best "estimate."

$$\boxed{96 \div 23} = 4.17$$

$$\underline{90 \div 30} \quad \text{A.} = 3$$

$$\underline{100 \div 20} \quad \text{B.} = 5$$

$$\underline{100 \div 25} \quad \text{C.} = 4$$

$$\boxed{234 \div 18} = 13$$

$$\underline{240 \div 20} \quad \text{D.} = 12$$

$$\underline{300 \div 15} \quad \text{E.} = 20$$

$$\underline{200 \div 20} \quad \text{F.} = 10$$

$$\begin{array}{r} c + 2d = b \\ \frac{1}{4} + \frac{2}{8} = \frac{1}{2} \\ 3e + 3e = 3d \\ \frac{3}{16} + \frac{3}{16} = \frac{3}{8} \\ a = 3d = 5d \\ 1 - \frac{3}{8} = \frac{5}{8} \end{array}$$

$$\underline{8 \times 10} = 80$$

$$\underline{80 \times 10} = 800$$

$$\underline{8 \times 100} = 800$$

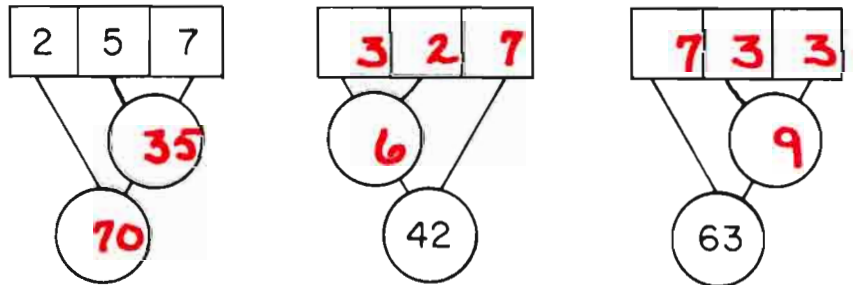
$$\underline{8 \times 50} = 400$$

$$\underline{80 \times 50} = 4,000$$

$$\underline{5 \times 800} = 4,000$$

$$\underline{50 \times 800} = 40,000$$

$$\underline{80 \times 500} = 40,000$$



	100%	50%	150%	25%	200%
\$ 400	\$ 400	\$ 200	\$ 600	\$ 100	\$ 800
\$ 300	\$ 300	\$ 150	\$ 450	\$ 75	\$ 600
\$ 50	\$ 50	\$ 25	\$ 75	\$ 12.50	\$ 100

1 week = 7 days

wk.	da.	
1	6	13 da.
2	4	18 da.
3	10	31 da.

wk.	da.	
3	0	21 da.
1	5	12 da.
1	2	9 da.



How do you feel?

If the results aren't interesting
then one of us goofed! signed "GOOOOOFY."

See: D&P 207-221

$$\begin{array}{r} 37 \\ \times 6 \\ \hline 222 \end{array}$$

A.

$$\begin{array}{r} 148 \\ \times 3 \\ \hline 444 \end{array}$$

B.

$$\begin{array}{r} 37 \\ \times 9 \\ \hline 333 \end{array}$$

C.

$$\begin{array}{r} 148 \\ \times 6 \\ \hline 888 \end{array}$$

D.

$$\begin{array}{r} 74 \\ \times 3 \\ \hline 222 \end{array}$$

A.

$$\begin{array}{r} 185 \\ \times 3 \\ \hline 555 \end{array}$$

G.

$$\begin{array}{r} 74 \\ \times 9 \\ \hline 666 \end{array}$$

B.

$$\begin{array}{r} 185 \\ \times 6 \\ \hline 1110 \end{array}$$

F.

$$\begin{array}{r} 259 \\ \times 3 \\ \hline 777 \end{array}$$

C.

$$\begin{array}{r} 74 \\ \times 6 \\ \hline 444 \end{array}$$

D.

$$\begin{array}{r} 555 \\ \times 2 \\ \hline 1110 \end{array}$$

F.

$$\begin{array}{r} 37 \\ \times 3 \\ \hline 111 \end{array}$$

D.

$$\begin{array}{r} 12 \\ \times 37 \\ \hline \end{array}$$

444 D.

$$\begin{array}{r} 37 \\ \times 15 \\ \hline \end{array}$$

555 A.

$$\begin{array}{r} 18 \\ \times 37 \\ \hline \end{array}$$

666 B.

$$\begin{array}{r} 296 \\ \times 3 \\ \hline 888 \end{array}$$

D.

$$\begin{array}{r} 555 \\ \times 8 \\ \hline 4440 \end{array}$$

C.

$$\begin{array}{r} 37 \\ \times 27 \\ \hline \end{array}$$

999 A.

$$\begin{array}{r} 37 \\ \times 48 \\ \hline \end{array}$$

1776 C.

$$\begin{array}{r} 12 \\ \times 74 \\ \hline \end{array}$$

888 D.

$$\begin{array}{r} 24 \\ \times 37 \\ \hline \end{array}$$

888 F.

$$\begin{array}{r} 185 \\ \times 24 \\ \hline \end{array}$$

4440 C.

$$\begin{array}{r} 74 \\ \times 24 \\ \hline \end{array}$$

1776 H.

$$\begin{array}{r} 148 \\ \times 12 \\ \hline \end{array}$$

1776 C.

$$\begin{array}{r} 370 \\ \times 12 \\ \hline \end{array}$$

4440 F.

$$\begin{array}{r} 37 \\ \times 24 \\ \hline \end{array}$$

888 D.

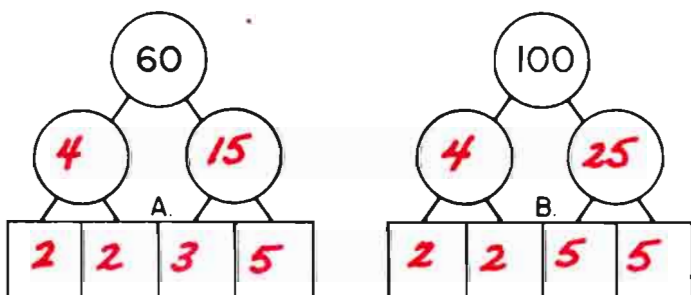
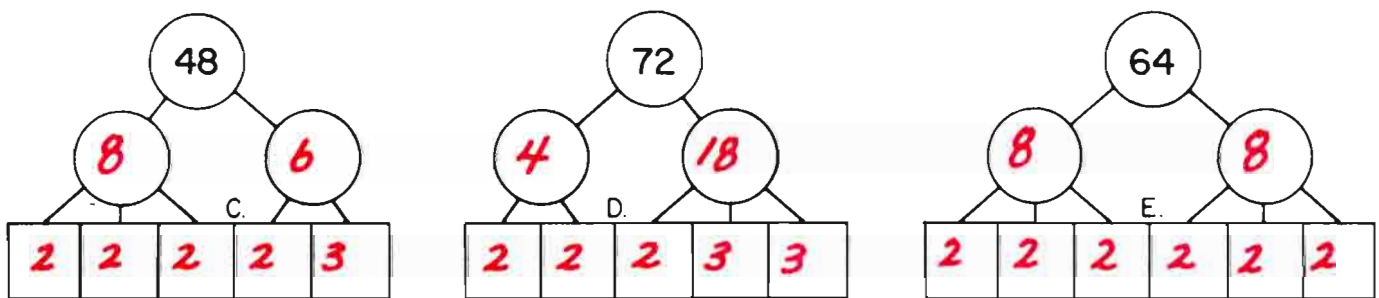
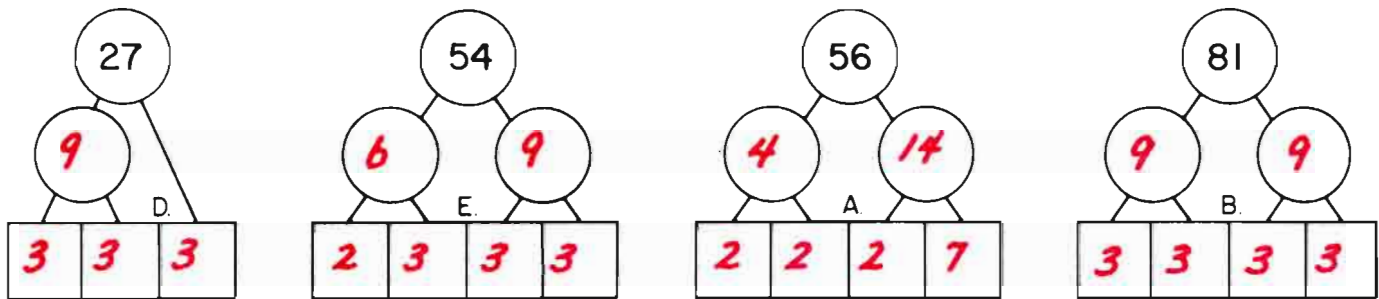
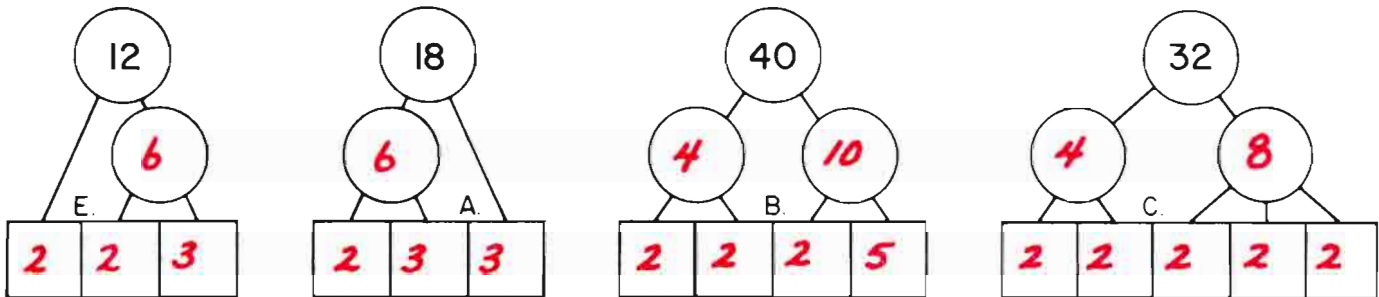
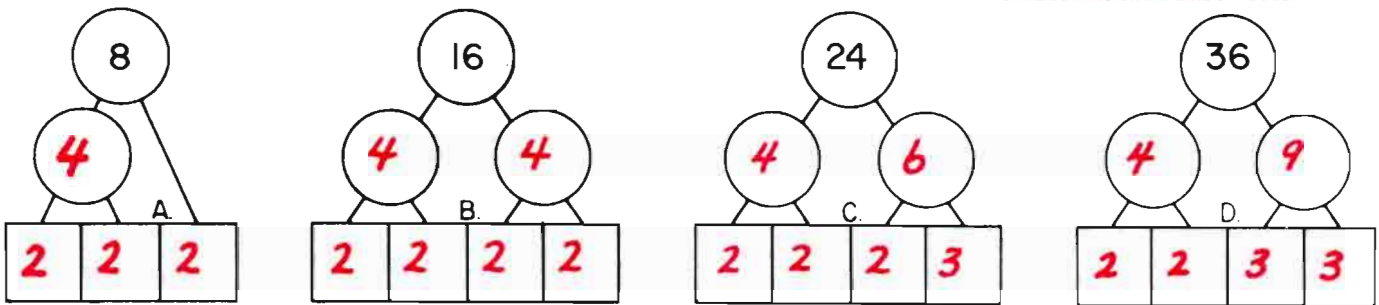
$$\begin{array}{r} 74 \\ \times 60 \\ \hline \end{array}$$

4440 C.

	A.	B.	C.	D.
E.	2220	666	333	111
F.	222	1110	4440	888
G.	555	444	777	444
H.	999	3330	1776	5550

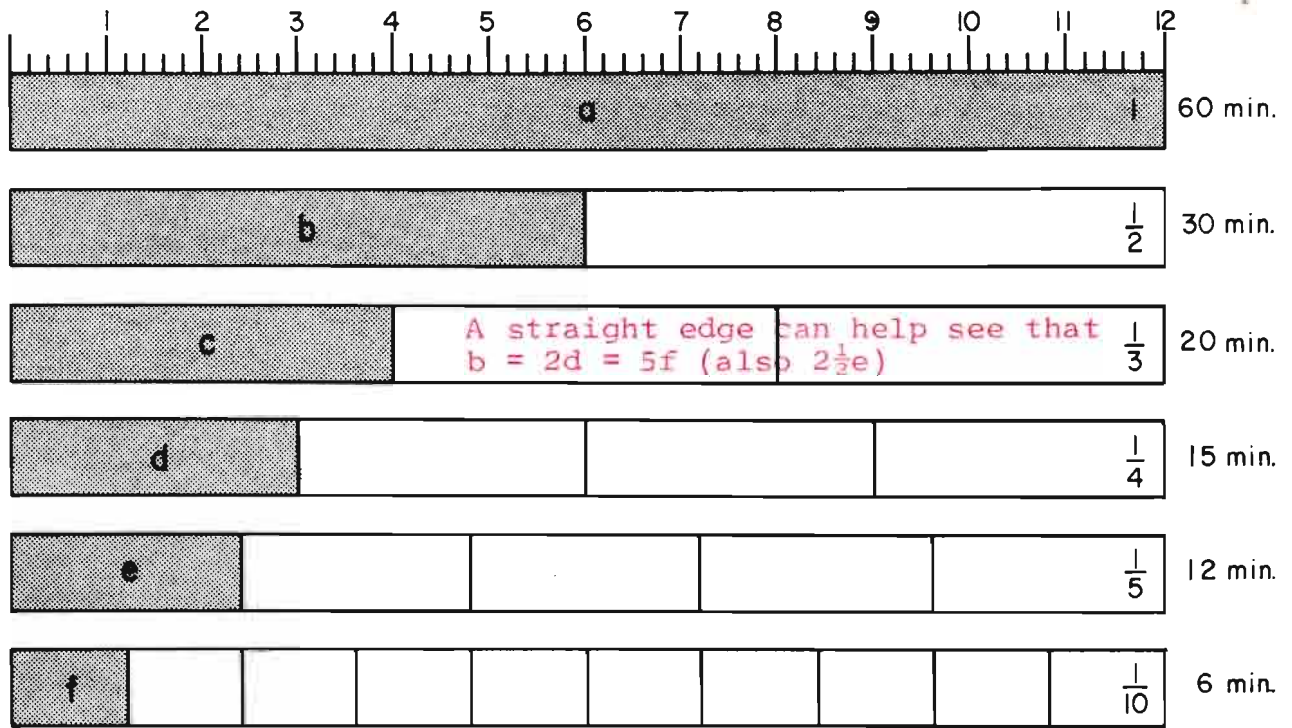
Factor Trees (excluding 1 as a factor)

See: D&P 177-180



A.	B.	C.	D.	E.
2,2,2,7	2,2,2,5	5,5,5,5	2,2,3,3	7,7,7
2,2,2	3,3,3,3	2,2 2,2,2	3,7,5	2,2,2 2,2,2
2,2,3,5	2,2,5,5	2,2,2,3	2,2,2 3,3	2,2,3
2,3,3	2,2,2,2	2,2 2,2,3	3,3,3	2,3,3,3

What Can You See? . . . (suggested by a clock)



Also see: D&P 222-230

$$\frac{e}{5} - \frac{f}{10} = \frac{f}{10}$$

$$\frac{a}{1} - \frac{2c}{3} = \frac{c}{3} \quad \text{A.}$$

$$\frac{b}{2} + \frac{d}{4} = \frac{3d}{4} \quad \text{B. C. D.}$$

$$\frac{2e}{5} + \frac{f}{10} = \frac{b}{2} \quad \text{E. A. B.}$$

$$\frac{3e}{5} - \frac{f}{10} = \frac{b}{2} \quad \text{C. F. G.}$$

$$\frac{b}{2} + \frac{e}{5} = \frac{7f}{10} \quad \text{B. D. E.}$$

$$\frac{b}{2} - \frac{d}{4} = \frac{d}{4} \quad \text{B. F. C.}$$

$$\frac{3d}{4} - \frac{b}{2} = \frac{d}{4} \quad \text{A. B. F.}$$

$$\frac{3e}{5} + \frac{3f}{10} = \frac{9f}{10} \quad \text{H. G. F.}$$

$$\frac{3f}{10} \times 2 = \frac{3e}{5} \quad \text{C. H.}$$

$$\frac{c}{3} \times 3 = \frac{a}{1} \quad \text{A. E.}$$

$$\frac{3e}{5} \div 2 = \frac{3f}{10} \quad \text{C. G.}$$

$$\frac{a}{1} \div 10 = \frac{f}{10} \quad \text{F.}$$

	A.	B.	C.	D.	E.
F.	$\frac{1}{10}$	$\frac{9}{10}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{7}{10}$
G.	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{10}$	$\frac{1}{5}$	$\frac{2}{5}$
H.	$\frac{1}{3}$	$\frac{1}{8}$	$\frac{3}{5}$	$\frac{3}{4}$	1

From Easier $\xrightarrow{\text{to}}$ more Difficult

From Easier
 \downarrow
 to
 more Difficult

Encourage the students to look at the relationship among the consecutive lines in the work below.

100 %	1%	2%	3%	4%	5%	6%
\$ 1.00	\$.01	\$.02	\$.03	\$.04 A.	\$.05 B.	\$.06 C.
\$.50	\$.00 $\frac{1}{2}$	\$.01	\$.01 $\frac{1}{2}$	\$.02	\$.02 $\frac{1}{2}$	\$.03 D.
\$ 1.50	\$.01 $\frac{1}{2}$	\$.03 D.	\$.04$\frac{1}{2}$ A.	\$.06 C.	\$.07$\frac{1}{2}$	\$.09 E.
\$ 3.00	\$.03 D.	\$.06 C.	\$.09 E.	\$.12	\$.15	\$.18 E.

100 %	101%	102%	103%	104%	105%	106%
\$ 1.00	\$ 1.01	\$ 1.02	\$ 1.03 E.	\$ 1.04 A.	\$ 1.05	\$ 1.06 B.
\$.50	\$.50 $\frac{1}{2}$	\$.51	\$.51 $\frac{1}{2}$	\$.52 C.	\$.52$\frac{1}{2}$	\$.53 C.
\$ 1.50	\$ 1.51 $\frac{1}{2}$	\$ 1.53 D.	\$ 1.54$\frac{1}{2}$ C.	\$ 1.56 D.	\$ 1.57 $\frac{1}{2}$	\$ 1.59 D.
\$ 3.00	\$ 3.03	\$ 3.06 A.	\$ 3.08	\$ 3.12 B.	\$ 3.15	\$ 3.18 E.

$$9 (\times 3) 27 (\times 2) 54$$

$$42 (- 8) 34 (- 14) 20$$

$$9 (\times 2) 18 (\times 3) 54$$

$$42 (- 14) 28 (- 8) 20$$

$$54 (\div 2) 27 (\div 3) 9$$

$$100 (- 75) 25 (+ 25) 50$$

	A.	B.	C.	D.	E.
F.	1.04	1.52 $\frac{1}{2}$.06	1.56	1.03
G.	.04	3.12	.53	.03	3.18
H.	3.06	.05	1.54 $\frac{1}{2}$	1.59	.09
I.	.04 $\frac{1}{2}$	1.06	.52	1.53	.18

+, -, × and ÷ Measurements

1 hour = 60 minutes

1 gallon = 8 pints

$$\begin{array}{r|l} \text{hr. min.} & \\ \hline 1 & 30 \\ \hline + & 45 \\ \hline \hline 1 & 15 \\ \hline \text{A.} & \end{array} \quad \begin{array}{l} 30 \text{ min.} \\ 45 \text{ min.} \\ 75 \text{ min.} \end{array}$$

$$\begin{array}{r|l} \text{gal. pt.} & \\ \hline 1 & 6 \\ \hline + & 3 \ 5 \\ \hline \hline 5 & 3 \\ \hline \text{B.} & \end{array} \quad \begin{array}{l} 14 \text{ pt.} \\ 29 \text{ pt.} \\ 43 \text{ pt.} \end{array}$$

$$\begin{array}{r|l} \$10 & \$1 \\ \hline 1 & 6 \\ \hline + & 3 \ 5 \\ \hline \hline 5 & 1 \\ \hline \text{C.} & \end{array} \quad \begin{array}{l} \$16 \\ \$35 \\ \$51 \end{array}$$

$$\begin{array}{r|l} \text{hr. min.} & \\ \hline 1 & 80 \\ \hline - & 30 \\ \hline \hline 1 & 40 \\ \hline \text{D.} & \end{array} \quad \begin{array}{l} 130 \text{ min.} \\ 30 \text{ min.} \\ 100 \text{ min.} \end{array}$$

$$\begin{array}{r|l} \text{gal. pt.} & \\ \hline 3 & 4 \\ \hline - & 1 \ 7 \\ \hline \hline 2 & 1 \\ \hline \text{E.} & \end{array} \quad \begin{array}{l} 32 \text{ pt.} \\ 15 \text{ pt.} \\ 17 \text{ pt.} \end{array}$$

$$\begin{array}{r|l} \text{10¢} & \text{1¢} \\ \hline 4 & 0 \\ \hline - & 1 \ 7 \\ \hline \hline 2 & 3 \\ \hline \text{F.} & \end{array} \quad \begin{array}{l} 40 \text{ ¢} \\ 17 \text{ ¢} \\ 23 \text{ ¢} \end{array}$$

$$\begin{array}{r|l} \text{hr. min.} & \\ \hline 1 & 15 \\ \hline \times & 4 \\ \hline \hline 5 & 0 \\ \hline \text{G.} & \end{array} \quad \begin{array}{l} 75 \text{ min.} \\ \times 4 \\ 300 \text{ min.} \end{array}$$

$$\begin{array}{r|l} \text{gal. pt.} & \\ \hline 1 & 3 \\ \hline \times & 3 \\ \hline \hline 4 & 1 \\ \hline \text{H.} & \end{array} \quad \begin{array}{l} 11 \text{ pt.} \\ \times 3 \\ 33 \text{ pt.} \end{array}$$

$$\begin{array}{r|l} \text{dm.} & \text{cm.} \\ \hline 1 & 3 \\ \hline \times & 3 \\ \hline \hline 3 & 9 \\ \hline \text{A.} & \end{array} \quad \begin{array}{l} 13 \text{ cm.} \\ \times 3 \\ 39 \text{ cm.} \end{array}$$

$$\begin{array}{r|l} \text{hr. min.} & \\ \hline 2 & 0 \\ \hline \div & 8 \\ \hline \hline 1 & 5 \\ \hline \text{B.} & \end{array} \quad \begin{array}{l} 120 \text{ min.} \\ \div 8 \\ 15 \text{ min.} \end{array}$$

$$\begin{array}{r|l} \text{gal. pt.} & \\ \hline 3 & 4 \\ \hline \div & 3 \\ \hline \hline 1 & 4 \\ \hline \end{array} \quad \begin{array}{l} 12 \text{ pt.} \\ \div 3 \\ 12 \text{ pt.} \end{array}$$

$$\begin{array}{r|l} \text{10's} & \text{1's} \\ \hline 5 & 4 \\ \hline \div & 3 \\ \hline \hline 1 & 8 \\ \hline \text{E.} & \end{array} \quad \begin{array}{l} 54 \text{ (1's)} \\ \div 3 \\ 18 \text{ (1's)} \end{array}$$

$$\begin{array}{r|l} \text{hr. min.} & \\ \hline 3 & 4 \\ \hline - & 1 \ 52 \\ \hline \hline 2 & 45 \\ \hline \text{F.} & \end{array} \quad \begin{array}{l} 277 \text{ min.} \\ 112 \text{ min.} \\ 165 \text{ min.} \end{array}$$

$$\begin{array}{r|l} \text{gal. pt.} & \\ \hline 1 & 3 \\ \hline + & 5 \ 5 \\ \hline \hline 7 & 0 \\ \hline \text{H.} & \end{array} \quad \begin{array}{l} 11 \text{ pt.} \\ 45 \text{ pt.} \\ 56 \text{ pt.} \end{array}$$

	A.	B.	C.	D.	E.
F.	2,45	3,3	5,1	2,3	1,8
G.	3,9	5,3	5,0	1,6	2,1
H.	1,15	0,15	4,1	1,40	7,0

Estimation . . . or "coming close" . . . with easier arithmetic.

(How close?)

Getting an exact result

$$12 \times 18 = 216$$

-2	-2	→	10 × 16	=	160	A. (-56)
+2	+2	→	14 × 20	=	280	B. (+64)
-2	+2	→	10 × 20	=	200	C. (-16)

$$\begin{array}{r} 18 \\ \times 12 \\ \hline 216 \end{array}$$

x "closest"

$$9 \times 14 = 126$$

+4	-4	→	13 × 10	=	130	D. (+4)
+1	+1	→	10 × 15	=	150	E. (+24)
+1	-1	→	10 × 13	=	130	G. (+4)

$$\begin{array}{r} 14 \\ \times 9 \\ \hline 126 \end{array}$$

$$18 \times 23 = 414$$

+2	+2	→	20 × 25	=	500	(+86) A.
+2	-2	→	20 × 21	=	420	(+6) B.
+2	-3	→	20 × 20	=	400	(-14) C.

$$\begin{array}{r} 23 \\ \times 18 \\ \hline 414 \end{array}$$

$$17 \times 32 = 544$$

+3	-1	→	20 × 31	=	620	A. (+76)
+3	-3	→	20 × 29	=	580	B. (+36)
+3	-5	→	20 × 27	=	540	C. (-4)
+4	-2	→	21 × 30	=	630	(+86)
+2	-2	→	19 × 30	=	570	(+26) D.
+1	-2	→	18 × 30	=	540	F. (-4) E.

	A.	B.	C.	D.
E.	+86	-4	200	150
F.	160	+6	540	+26
G.	620	580	-14	130
H.	+36	280	+66	+70

Please indicate the largest amount with an A in the tinted block; the next largest with a B, the next with a C, and the smallest with a D.

- 18 days **18** **D**
- Month of January **31** **A**
- Three weeks **21** **B**
- Two weeks and 5 days **19** **C**

Please find the difference in days between:

- A and B: $\frac{10}{A}$ da. A and C: $\frac{12}{D}$ da.
- A and D: $\frac{13}{B}$ da. B and C: $\frac{2}{E}$ da.
- B and D: $\frac{3}{C}$ da. C and D: $\frac{1}{F}$ da.

- 100 nickels **A** **500**
- Three dollars and 20 cents **C** **320**
- 14 quarters **B** **350**
- 280 pennies **D** **280**

Please find the difference in dimes between:

- A and B: $\frac{15}{A}$ dimes A and C: $\frac{18}{D}$ dimes
- A and D: $\frac{22}{B}$ dimes B and C: $\frac{3}{E}$ dimes
- B and D: $\frac{7}{C}$ dimes C and D: $\frac{4}{F}$ dimes

There are 3 feet in 1 yard

- One yard **36** **B**
- Four feet **48** **A**
- A half a yard **18** **D**
- Three fourth of a yard **27** **C**

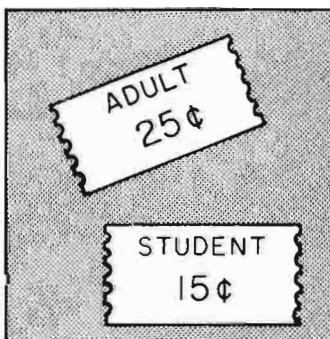
Please find the difference in inches between:

- A and B: $\frac{12}{D}$ in. A and C: $\frac{21}{C}$ in.
- A and D: $\frac{30}{A}$ in. B and C: $\frac{9}{B}$ in.
- B and D: $\frac{18}{A}$ in. C and D: $\frac{9}{J}$ in.

- Half a day **D** **12**
- Forty-eight hours **A** **48**
- 1¼ days **C** **30**
- One day and 17 hours **B** **41**

Please find the difference in hours between:

- A and B: $\frac{7}{A}$ hr. A and C: $\frac{18}{A}$ hr.
- A and D: $\frac{36}{A}$ hr. B and C: $\frac{11}{C}$ hr.
- B and D: $\frac{29}{C}$ hr. C and D: $\frac{18}{I}$ hr.



one of each	40 ¢	D.
2 student, 1 adult	55 ¢	E.
4 student, 2 adult	\$1.10	D.
6 student, 3 adult	\$1.65	E.
13 student	\$1.95	F.

	A.	B.	C.	D.	E.
F.	1.95	22	11	1	4
G.	10	30	7	40	2
H.	15	13	21	18	55
I.	18	36	3	1.10	3
J.	7	9	29	12	1.65

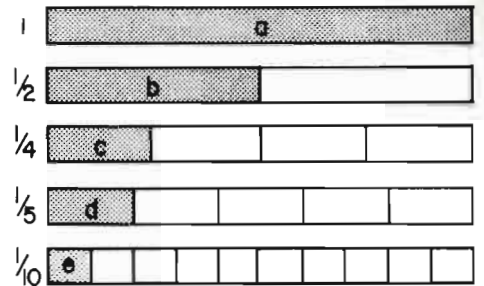
On Your Own (III)

$$\begin{array}{r} 175 \\ + 392 \\ \hline 567 \end{array}$$

$$\begin{array}{r} 37 \\ \times 9 \\ \hline 333 \end{array}$$

$$\begin{array}{r} 37 \\ \times 12 \\ \hline 74 \\ 37 \\ \hline 444 \end{array}$$

$$\begin{array}{r} 101 \\ \times 63 \\ \hline 303 \\ 606 \\ \hline 6363 \end{array}$$



Please circle the letter after the line you think will be the best "estimate."

$$18 \times 21 = 378$$

$$25 \times 25 = 625$$

$$20 \times 23 \quad \text{A} = 460$$

$$20 \times 30 \quad \text{D} = 600$$

$$20 \times 20 \quad \text{B} = 400$$

$$20 \times 25 \quad \text{E} = 500$$

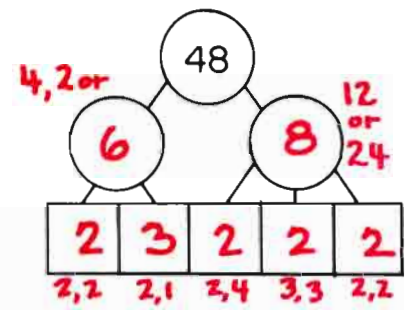
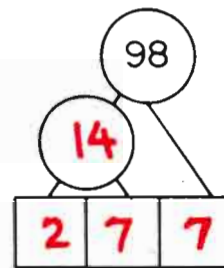
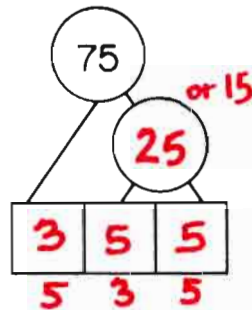
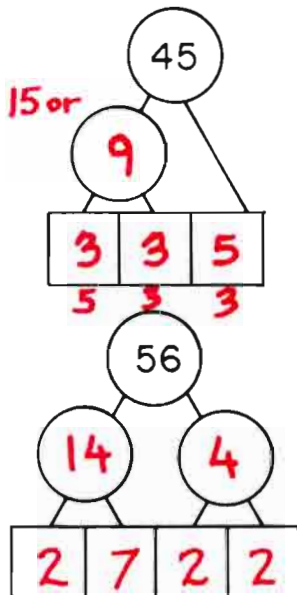
$$15 \times 20 \quad \text{C} = 300$$

$$30 \times 30 \quad \text{F} = 900$$

$$b - e = \frac{2d}{2/5}$$

$$2d + e = \frac{b}{1/2}$$

$$3e + e = \frac{2d}{2/5}$$



	100 %	2 %	5 %	102 %	105 %
\$ 1.00	\$ 1.00	\$.02	\$.05	\$ 1.02	\$ 1.05
\$ 100	\$ 100	\$ 2.	\$ 5.	\$ 102.	\$ 105.
\$ 50	\$ 50	\$ 1.	\$ 2.5	\$ 51.	\$ 52.5



How do you feel?

1 pound (lb.) = 16 ounces (oz.)

$$\begin{array}{r|l} \text{lb.} & \text{oz.} \\ \hline 2 & 16 \\ 3 & 0 \\ \hline - & 1 \quad 13 \\ \hline 1 & 3 \\ \hline \end{array} \quad \begin{array}{l} 31 \\ 48 \text{ oz.} \\ 29 \text{ oz.} \\ 19 \text{ oz.} \end{array}$$

$$\begin{array}{r|l} \text{lb.} & \text{oz.} \\ \hline 2 & 5 \\ \hline \times 4 & \times 4 \\ \hline 9 & 4 \\ \hline \end{array} \quad \begin{array}{l} 2 \\ 37 \text{ oz.} \\ 148 \text{ oz.} \end{array}$$

If the results aren't interesting, then one of us goofed! signed "GOOOOOFY"

See: D&P 206A-206C

$$\begin{array}{r} 5 \\ 26 \\ \times 9 \\ \hline 234 \end{array}$$

$$\begin{array}{r} 81 \\ \times 3 \\ \hline 243 \end{array}$$

$$\begin{array}{r} 2 \\ 54 \\ \times 6 \\ \hline 324 \end{array}$$

$$\begin{array}{r} 5 \\ 36 \\ \times 9 \\ \hline 324 \end{array}$$

$$\begin{array}{r} 3 \\ 54 \\ \times 8 \\ \hline 432 \end{array}$$

$$\begin{array}{r} 1 \\ 72 \\ \times 6 \\ \hline 432 \end{array}$$

$$\begin{array}{r} 81 \\ \times 4 \\ \hline 324 \end{array}$$

$$\begin{array}{r} 6 \\ 47 \\ \times 9 \\ \hline 423 \end{array}$$

$$\begin{array}{r} 4 \\ 57 \\ \times 6 \\ \hline 342 \end{array}$$

$$\begin{array}{r} 7 \\ 38 \\ \times 9 \\ \hline 342 \end{array}$$

$$\begin{array}{r} 1 \\ 117 \\ \times 2 \\ \hline 234 \end{array}$$

$$\begin{array}{r} 9 \\ 108 \\ \times 4 \\ \hline 432 \end{array}$$

$$\begin{array}{r} 1 \\ 171 \\ \times 2 \\ \hline 342 \end{array}$$

$$\begin{array}{r} 1 \\ 162 \\ \times 2 \\ \hline 324 \end{array}$$

$$\begin{array}{r} 1 \\ 114 \\ \times 3 \\ \hline 342 \end{array}$$

$$\begin{array}{r} 1 \\ 144 \\ \times 3 \\ \hline 432 \end{array}$$

$$\begin{array}{r} 1 \\ 141 \\ \times 3 \\ \hline 423 \end{array}$$

$$\begin{array}{r} 1 \\ 216 \\ \times 2 \\ \hline 432 \end{array}$$

$$\begin{array}{r} 2 \\ 108 \\ \times 3 \\ \hline 324 \end{array}$$

$$\begin{array}{r} 5 \\ 39 \\ \times 6 \\ \hline 234 \end{array}$$

$$\begin{array}{r} 2 \\ 18 \\ \times 13 \\ \hline 154 \\ 18 \\ \hline 234 \end{array}$$

$$\begin{array}{r} 7 \\ 19 \\ \times 18 \\ \hline 152 \\ 19 \\ \hline 342 \end{array}$$

$$\begin{array}{r} 4 \\ 27 \\ \times 12 \\ \hline 54 \\ 27 \\ \hline 324 \end{array}$$

$$\begin{array}{r} 6 \\ 18 \\ \times 18 \\ \hline 144 \\ 18 \\ \hline 324 \end{array}$$

$$\begin{array}{r} 36 \\ \times 12 \\ \hline 72 \\ 36 \\ \hline 432 \end{array}$$

Pairs of Single-Digit Whole Number Factors.

Rule: if not alike, please write the larger factor above the smaller factor.

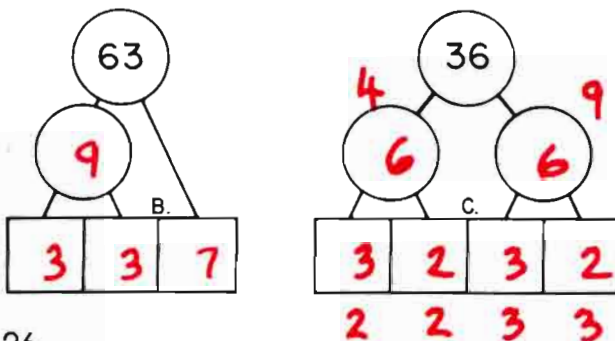
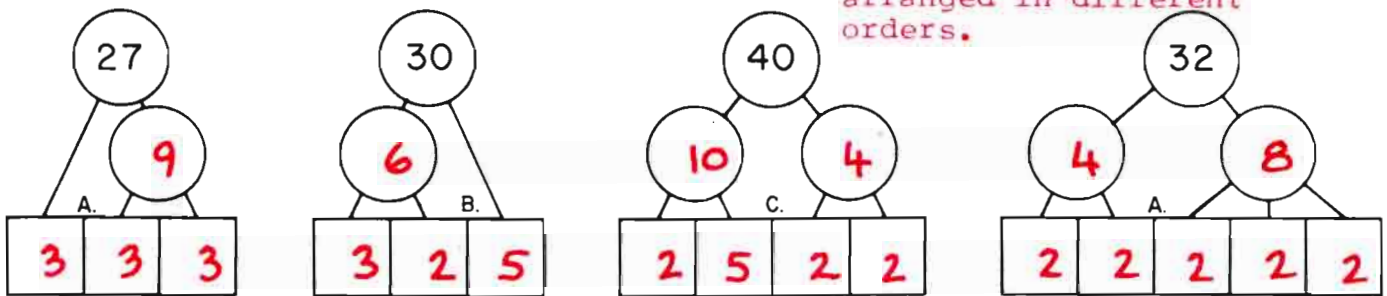
$\begin{array}{r} 5^A \\ \times 5 \\ \hline 25 \end{array}$	$\begin{array}{r} 7^B \\ \times 2 \\ \hline 14 \end{array}$	$\begin{array}{r} 7^C \\ \times 4 \\ \hline 28 \end{array}$	$\begin{array}{r} 8^D \\ \times 7 \\ \hline 56 \end{array}$	$\begin{array}{r} 9^E \\ \times 2 \\ \hline 18 \end{array}$	$\begin{array}{r} 6^F \\ \times 6 \\ \hline 36 \end{array}$	$\begin{array}{r} 9 \\ \times 4 \\ \hline 36 \end{array}$	$\begin{array}{r} 9^H \\ \times 8 \\ \hline 72 \end{array}$	$\begin{array}{r} 8^I \\ \times 4 \\ \hline 32 \end{array}$	$\begin{array}{r} 8^J \\ \times 8 \\ \hline 64 \end{array}$
$\begin{array}{r} 6 \\ \times 5 \\ \hline 30 \end{array}$	$\begin{array}{r} 7^F \\ \times 7 \\ \hline 49 \end{array}$	$\begin{array}{r} 7 \\ \times 3 \\ \hline 21 \end{array}$	$\begin{array}{r} 7^E \\ \times 6 \\ \hline 42 \end{array}$	$\begin{array}{r} 9^A \\ \times 7 \\ \hline 63 \end{array}$	$\begin{array}{r} 6 \\ \times 4 \\ \hline 24 \end{array}$	$\begin{array}{r} 8 \\ \times 3 \\ \hline 24 \end{array}$	$\begin{array}{r} 8^D \\ \times 6 \\ \hline 48 \end{array}$	$\begin{array}{r} 9^F \\ \times 9 \\ \hline 81 \end{array}$	$\begin{array}{r} 9^H \\ \times 8 \\ \hline 72 \end{array}$
$\begin{array}{r} 7^F \\ \times 5 \\ \hline 35 \end{array}$	$\begin{array}{r} 9^D \\ \times 5 \\ \hline 45 \end{array}$	$\begin{array}{r} 9 \\ \times 3 \\ \hline 27 \end{array}$	$\begin{array}{r} 9^C \\ \times 6 \\ \hline 54 \end{array}$	$\begin{array}{r} 9^F \\ \times 9 \\ \hline 81 \end{array}$	$\begin{array}{r} 8 \\ \times 5 \\ \hline 40 \end{array}$	$\begin{array}{r} 4 \\ \times 4 \\ \hline 16 \end{array}$	$\begin{array}{r} 8 \\ \times 2 \\ \hline 16 \end{array}$	$\begin{array}{r} 8^H \\ \times 6 \\ \hline 48 \end{array}$	$\begin{array}{r} 8^J \\ \times 8 \\ \hline 64 \end{array}$

Taming frightfully big numbers . . .

$\begin{array}{r} 9 \times 9 \\ \hline = 81 \end{array}$	$\begin{array}{r} 5 \times 6 \\ \hline = 30 \end{array}$	$\begin{array}{r} 4 \times 25 \\ \hline = 100 \end{array}$
$\begin{array}{r} 90 \times 9 \\ \hline = 810^A \end{array}$	$\begin{array}{r} 5 \times 60 \\ \hline = 300^E \end{array}$	$\begin{array}{r} 8 \times 25 \\ \hline = 200^C \end{array}$
$\begin{array}{r} 9 \times 90 \\ \hline = 810^G \end{array}$	$\begin{array}{r} 5 \times 600 \\ \hline = 3,000^F \end{array}$	$\begin{array}{r} 4 \times 250 \\ \hline = 1,000^D \end{array}$
$\begin{array}{r} 9 \times 900 \\ \hline = 8100^B \end{array}$	$\begin{array}{r} 500 \times 6 \\ \hline = 3,000^H \end{array}$	$\begin{array}{r} 8 \times 250 \\ \hline = 2,000^E \end{array}$
$\begin{array}{r} 90 \times 90 \\ \hline = 8100^K \end{array}$	$\begin{array}{r} 50 \times 60 \\ \hline = 3,000^F \end{array}$	$\begin{array}{r} 40 \times 25 \\ \hline = 1,000^K \end{array}$
$\begin{array}{r} 900 \times 9 \\ \hline = 8100^B \end{array}$	$\begin{array}{r} 60 \times 50 \\ \hline = 3,000^H \end{array}$	$\begin{array}{r} 80 \times 25 \\ \hline = 2,000^I \end{array}$

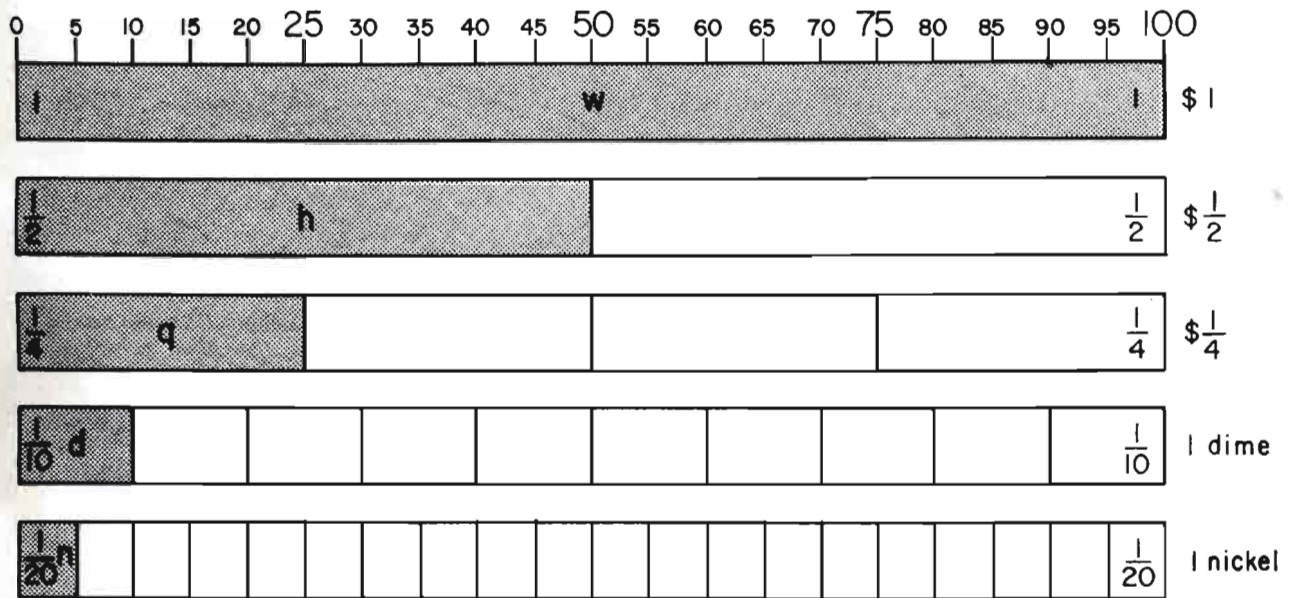
Factor Trees (excluding 1 as a factor)

Prime factors may be arranged in different orders.



	A.	B.	C.	D.	E.	F.
G.	810	2,3,5	9,6	8,7	7,6	7,7
H.	2,2,2,2,2	7,2	200	8,6	9,8	3,000
I.	5,5	3,3,7	2,2,3,3	8,4	2,000	6,6
J.	9,7	8,8	7,4	9,5	300	7,5
K.	3,3,3	8,100	2,2,2,5	1000	9,2	9,9

What Can You See? . . . (suggested by U. S. coins)



What else separates into fractional parts like money.....all metric measurements

$$\frac{2d + n}{\frac{2}{10} + \frac{1}{20}} = \frac{2}{\frac{1}{4}} \text{ F}$$

$$\frac{h - q}{\frac{1}{2} - \frac{1}{4}} = \frac{2}{\frac{1}{4}} \text{ C.}$$

$$\frac{q + 5n}{\frac{1}{4} + \frac{5}{20}} = \frac{h}{\frac{1}{2}} \text{ E.}$$

$$\frac{w - 2d}{1 - \frac{2}{10}} = \frac{8d}{\frac{8}{10}} \text{ A.}$$

$$\frac{q + n}{\frac{1}{4} + \frac{1}{20}} = \frac{3d}{\frac{3}{10}} \text{ D.}$$

$$\frac{3n + 7n}{\frac{3}{20} + \frac{7}{20}} = \frac{h}{\frac{1}{2}} \text{ F.}$$

$$\frac{h - 3d}{\frac{1}{2} - \frac{3}{10}} = \frac{2d}{\frac{2}{10}} \text{ B.}$$

$$\frac{7d - q}{\frac{7}{10} - \frac{1}{4}} = \frac{9n}{\frac{9}{20}} \text{ A.}$$

$$\frac{3q - 4d}{\frac{3}{4} - \frac{4}{10}} = \frac{7n}{\frac{7}{20}} \text{ C.}$$

$$\frac{4d + 7n}{\frac{4}{10} + \frac{7}{20}} = \frac{3q}{\frac{3}{4}} \text{ B.}$$

$$\frac{9n - 4n}{\frac{9}{20} - \frac{4}{20}} = \frac{2}{\frac{1}{4}} \text{ F.}$$

$$\frac{19n - 2q}{\frac{19}{20} - \frac{2}{4}} = \frac{9n}{\frac{9}{20}} \text{ H.}$$

$$\frac{3n \times 6}{\frac{1}{20} \times 6} = \frac{9d}{\frac{9}{10}} \text{ F.}$$

$$\frac{2d \times 5}{\frac{2}{10} \times 5} = \frac{w}{1} \text{ H.}$$

$$\frac{h \div 5}{\frac{1}{2} \div 5} = \frac{d}{\frac{1}{10}} \text{ E.}$$

$$\frac{h \div 10}{\frac{1}{2} \div 10} = \frac{n}{\frac{1}{20}} \text{ F.}$$

	A.	B.	C.	D.	E.
F.	$\frac{1}{20}$	$\frac{2}{10}$	$\frac{1}{4}$	$\frac{9}{10}$	$\frac{1}{2}$
G.	$\frac{8}{10}$	$\frac{4}{10}$	$\frac{7}{20}$	$\frac{7}{10}$	$\frac{1}{10}$
H.	$\frac{9}{20}$	$\frac{3}{4}$	$\frac{7}{10}$	$\frac{3}{10}$	1

From Easier $\xrightarrow{\text{to}}$ more Difficult

From Easier
↓ to
more Difficult

100 %	50%	25%	75%	10%	85%	95 %
\$ 1000.00	\$ 500	\$ 250	\$ 750	\$ 100	\$ 850	\$ 950 _{B.}
\$ 500.00	\$ 250	\$ 125	\$ 375	\$ 50	\$ 425	\$ 475
\$ 250.00	\$ 125	\$ 62.50 _{E.}	\$ 187.50	\$ 25	\$ 212.50 _{A.}	\$ 237.50 _{B.}
\$ 125.00	\$ 62.50 _{E.}	\$ 31.25	\$ 93.75 _{D.}	\$ 12.50	\$ 106.25 _{C.}	\$ 118.75 _{D.}

100 %	10%	20%	30%	110%	120%	130%
\$ 575.00	\$ 57.50	\$ 115.00	\$ 172.50	\$ 632.50 _{D.}	\$ 690.00 _{E.}	\$ 747.50 _{A.}
\$ 17.40	\$ 1.74	\$ 3.48 _{C.}	\$ 5.22 _{A.}	\$ 19.14 _{B.}	\$ 20.88 _{C.}	\$ 22.62 _{D.}
\$ 64.00	\$ 6.40	\$ 12.80	\$ 19.20 _{B.}	\$ 70.40	\$ 76.80	\$ 83.20
\$ 850.00	\$ 85 _{A.}	\$ 170	\$ 255	\$ 935 _{E.}	\$ 1020	\$ 1105 _{E.}

30 (-11) 19 (+ 9) 28

21 (÷ 3) 7 (× 2) 14

30 (+ 9) 39 (-11) 28

21 (× 2) 42 (÷ 3) 14

15 (+17) 32 (+8) 40

15 (+8) 23 (+17) 40

	A.	B.	C.	D.	E.
F.	212.50	19.20	3.48	93.75	62.50
G.	5.22	950.00	106.25	22.62	690.00
H.	85.00	237.50	20.88	632.50	1105
I.	747.50	19.14	115.00	118.75	935

+, -, × and ÷ Measurements

1 yard = 3 feet, 1 foot = 12 in.

1 gallon = 4 quarts, 1 quart = 4 half-pints

yd. ft. in.	
<u>1 1 9</u>	- 57 in.
+ <u> 1 3</u>	= 15 in.
<u>2 0 0</u>	= 72 in.
A.	

G. Q. $\frac{1}{2}$ P.	
<u>0 2 3</u>	- 11 $\frac{1}{2}$ P.
+ <u>0 2 1</u>	= 9 $\frac{1}{2}$ P.
<u>1 1 0</u>	= 20 $\frac{1}{2}$ P.
B.	

\$ 100 \$10 \$1	
<u>2 4 9</u>	\$ 249
+ <u>1 3 7</u>	\$ 137
<u>3 8 6</u>	\$ 386
C.	

yd. ft. in.	
<u>1 2 0</u>	- 72 in.
- <u> 2 10</u>	= 34 in.
<u>1 0 2</u>	= 38 in.
D.	

G. Q. $\frac{1}{2}$ P.	
<u>3 0 3</u>	- 51 $\frac{1}{2}$ P.
- <u> 1 1</u>	= 21 $\frac{1}{2}$ P.
<u>1 3 2</u>	= 30 $\frac{1}{2}$ P.
F.	

\$1 10¢ 1¢	
<u>3 0 0</u>	21 300 ¢
- <u> 2 8</u>	= 128 ¢
<u>1 7 2</u>	= 172 ¢

yd. ft. in.	
<u>1 2 5</u>	- 65 in.
x <u> 2</u>	x 2
<u>3 1 0</u>	= 130 in.
G.	

G. Q. $\frac{1}{2}$ P.	
<u>1 2 3</u>	- 27 $\frac{1}{2}$ P.
x <u> 3</u>	x 3
<u>5 0 1</u>	= 81 $\frac{1}{2}$ P.
H.	

M dm cm	
<u>1 2 3</u>	- 123 cm
x <u> 4</u>	x 4
<u>4 9 2</u>	= 492 cm
A.	

yd. ft. in.	
<u>1 1 3</u>	- 51 in.
÷ <u> 3</u>	÷ 3
<u>0 1 5</u>	= 17 in.
B.	

G. Q. $\frac{1}{2}$ P.	
<u>4 0 1</u>	- 65 $\frac{1}{2}$ P.
÷ <u> 5</u>	÷ 5
<u>0 3 1</u>	= 13 $\frac{1}{2}$ P.
C.	

100s 10s 1s	
<u>7 2 8</u>	- 728 (1s)
÷ <u> 4</u>	÷ 4
<u>1 8 2</u>	= 182 (1s)
D.	

yd. ft. in.	
<u>1 2 11</u>	- 71 in.
+ <u> 1 11</u>	= 59 in.
<u>3 1 0</u>	= 130 in.
A.	

G. Q. $\frac{1}{2}$ P.	
<u>3 0 0</u>	- 48 $\frac{1}{2}$ P.
- <u> 1 1</u>	= 21 $\frac{1}{2}$ P.
<u>1 2 3</u>	= 27 $\frac{1}{2}$ P.
D.	

	A.	B.	C.	D.
E.	4,9,2	4,3,2	3,8,6	3,2,1
F.	2,3,4	1,1,0	1,3,2	1,0,2
G.	2,0,0	0,1,5	3,1,10	1,8,2
H.	3,1,10	5,0,1	0,3,1	1,2,3

Estimation

. . . or "coming close" . . . with easier arithmetic.

$$423 \div 9 = 47$$

$$\begin{array}{|c|c|} \hline +27 & +1 \\ \hline \end{array} \longrightarrow$$

$$450 \div 10 = 45 \quad (-2) \text{ A.}$$

$$\begin{array}{|c|c|} \hline -23 & +1 \\ \hline \end{array} \longrightarrow$$

$$400 \div 10 = 40 \quad (-7) \text{ B.}$$

$$\begin{array}{|c|c|} \hline +17 & +2 \\ \hline \end{array} \longrightarrow$$

$$440 \div 11 = 40 \quad (-7) \text{ F.}$$

(How close?)

Getting an exact result

$$9 \overline{)423} \begin{array}{r} 47 \\ \underline{36} \\ 63 \end{array}$$

$$684 \div 18 = 38$$

$$\begin{array}{|c|c|} \hline +16 & +2 \\ \hline \end{array} \longrightarrow$$

$$700 \div 20 = 35 \quad (-3) \text{ D.}$$

$$\begin{array}{|c|c|} \hline -34 & +2 \\ \hline \end{array} \longrightarrow$$

$$650 \div 20 = 32\frac{1}{2} \quad (-5\frac{1}{2}) \text{ A.}$$

$$\begin{array}{|c|c|} \hline -84 & -3 \\ \hline \end{array} \longrightarrow$$

$$600 \div 15 = 40 \quad (+2) \text{ B.}$$

$$18 \overline{)684} \begin{array}{r} 38 \\ \underline{54} \\ 144 \\ \underline{144} \\ 0 \end{array}$$

$$1265 \div 55 = 23$$

$$\begin{array}{|c|c|} \hline -65 & -5 \\ \hline \end{array} \longrightarrow$$

$$1200 \div 50 = 24 \quad (+1) \text{ C.}$$

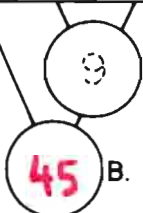
$$\begin{array}{|c|c|} \hline -65 & +5 \\ \hline \end{array} \longrightarrow$$

$$1200 \div 60 = 20 \quad (-3) \text{ D.}$$

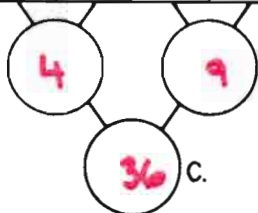
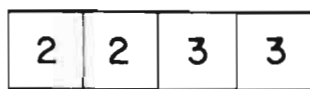
$$\begin{array}{|c|c|} \hline -5 & -5 \\ \hline \end{array} \longrightarrow$$

$$1260 \div 50 = 25\frac{1}{5} \quad (+2\frac{1}{5})$$

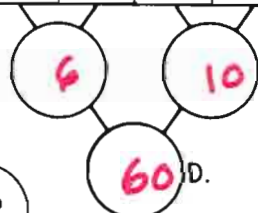
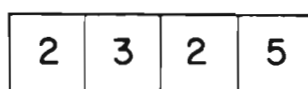
$$55 \overline{)1265} \begin{array}{r} 23 \\ \underline{110} \\ 165 \\ \underline{165} \\ 0 \end{array}$$



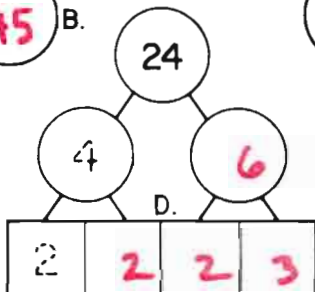
B.



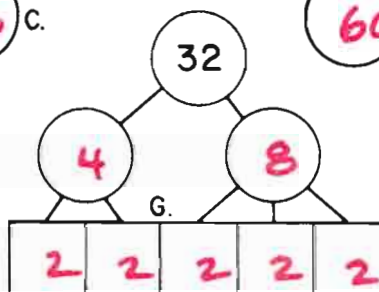
C.



D.



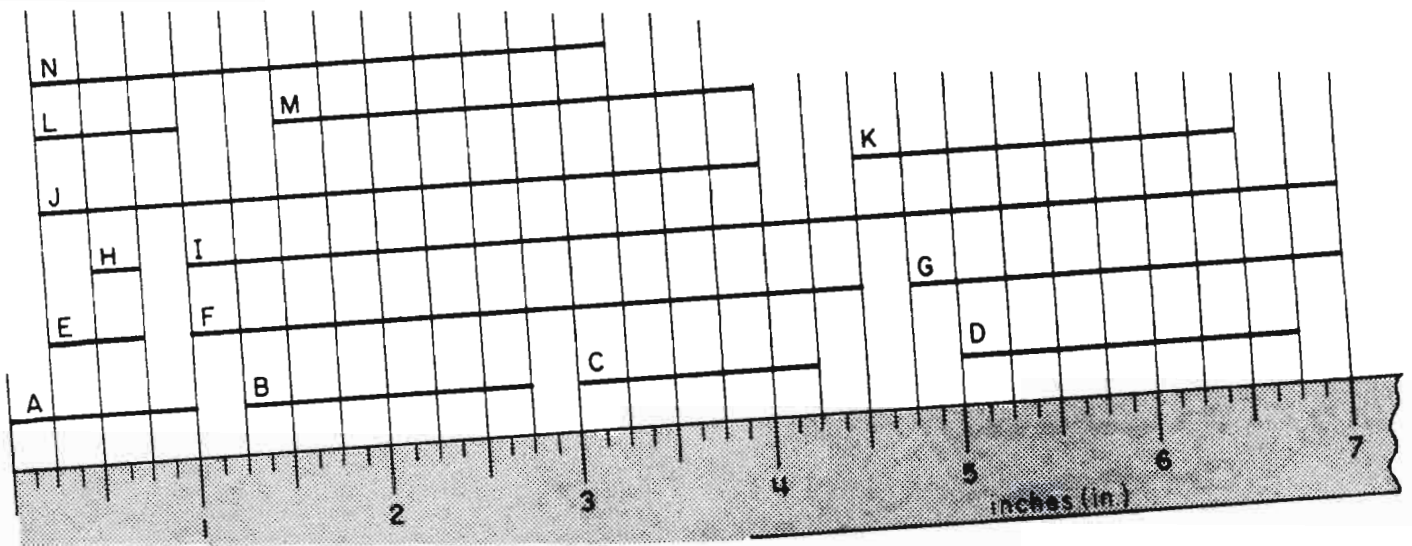
D.



G.

Factor Trees (excluding 1 as a factor)

	A.	B.	C.	D.
E.	$-5\frac{1}{2}$	45	+1	2,2,2,3
F.	+1	-7	36	-3
G.	-1	+2	47	2,2 2,2,2
H.	-2	23	38	60



Lengths of lines shown

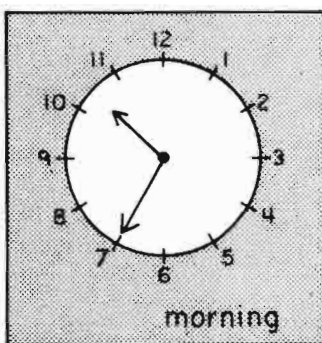
A: $\frac{1}{4}$ in. ^{a.}
 B: $1\frac{1}{2}$ in.
 C: $1\frac{1}{4}$ in. ^{d.}
 D: $1\frac{3}{4}$ in.
 E: $\frac{1}{2}$ in. ^{a.}
 F: $3\frac{1}{2}$ in.
 G: $2\frac{1}{4}$ in. ^{c.}
 H: $\frac{1}{4}$ in. ^{a.}
 I: 6 in.
 J: $3\frac{3}{4}$ in.
 K: 2 in.
 L: $\frac{3}{4}$ in.
 M: $2\frac{1}{2}$ in. ^{c.}
 N: 3 in.

Sums of lengths

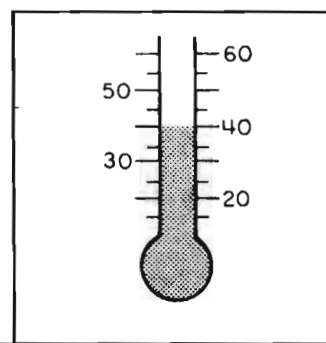
A and B: $2\frac{1}{2}$ in.
 C and D: 3 in. ^{d.}
 E and F: 4 in.
 G and M: $4\frac{3}{4}$ in. ^{d.}
 E and J: $4\frac{1}{4}$ in. ^{c.}
 L and M: $3\frac{1}{4}$ in. ^{c.}
 D and J: $5\frac{1}{2}$ in.

Differences of lengths

A and B: $\frac{1}{2}$ in. ^{a.}
 C and D: $\frac{1}{2}$ in. ^{a.}
 F and G: $1\frac{1}{4}$ in. ^{d.}
 H and I: $5\frac{3}{4}$ in.
 K and L: $1\frac{1}{4}$ in. ^{d.}
 M and N: $\frac{1}{2}$ in. ^{a.}
 F and J: $\frac{1}{4}$ in. ^{a.}



time shown	10:35 a.m.
20 minutes later	10:55 a.m. ^{b.}
2 hours later	12:35 p.m. ^{b.}
100 min. later	12:15 p.m. ^{b.}
$1\frac{1}{4}$ hr. earlier	9:20 a.m. ^{b.}
12 hr. later	10:35 p.m. ^{b.}



temperature shown	40°
7° colder	33° ^{a.}
38° warmer	78° ^{c.}
28° warmer	68°

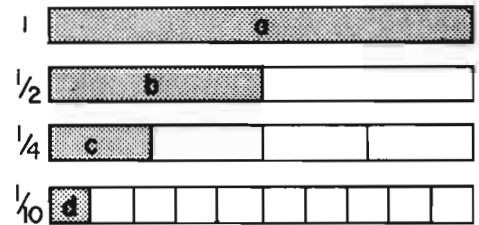
a.	b.	c.	d.
$\frac{1}{2}$	12:35	$\frac{3}{4}$	$2\frac{1}{4}$
1	10:55	$1\frac{3}{4}$	3
$\frac{1}{4}$	12:15	78	$1\frac{1}{4}$
33	10:35	$4\frac{1}{4}$	10
$2\frac{3}{4}$	9:20	$3\frac{1}{2}$	$4\frac{3}{4}$

On Your Own (IV)

$$\begin{array}{r} 23 \\ 2468 \\ 2468 \\ 2468 \\ +2468 \\ \hline 9872 \end{array} \quad \begin{array}{r} 123 \\ \times 4 \\ \hline 492 \end{array}$$

$$4 \overline{)728} \begin{array}{r} 182 \\ 4 \\ \underline{32} \\ 32 \\ \underline{8} \\ 8 \\ \hline 0 \end{array}$$

$$18 \overline{)666} \begin{array}{r} 37 \\ 54 \\ \underline{126} \\ 126 \\ \hline 0 \end{array}$$



Please circle the letter after the line you think will be the best "estimate."

$$\boxed{329 \div 17} = 19.35$$

$$\boxed{275 \div 28} = 9.82$$

$$\frac{300 \div 15}{\text{A.}} = 20$$

$$\frac{300 \div 25}{\text{D.}} = 12$$

$$\frac{300 \div 20}{\text{B.}} = 15$$

$$\frac{240 \div 30}{\text{E.}} = 8$$

$$\frac{350 \div 15}{\text{C.}} = 23.33$$

$$\frac{250 \div 25}{\text{F.}} = 10$$

$$a - 3c = c$$

$$1 - 3/4 = 1/4$$

$$3d + 2d = b$$

$$3/10 + 2/10 = 1/2$$

$$7d + 3d = a$$

$$7/10 + 3/10 = 1$$

$$4 \times 5 = 20$$

$$4 \times 50 = 200$$

$$40 \times 50 = 2,000$$

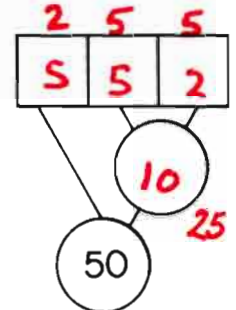
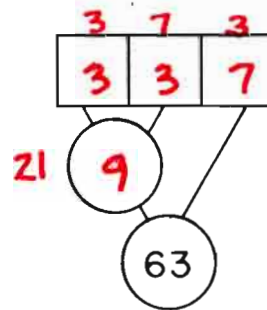
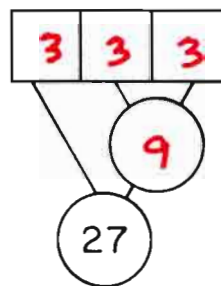
$$4 \times 25 = 100$$

$$40 \times 25 = 1,000$$

$$4 \times 250 = 1,000$$

$$40 \times 500 = 20,000$$

$$40 \times 250 = 10,000$$



100 %	50 %	125 %	10 %	150 %
\$ 500	\$ 250	\$ 625	\$ 50	\$ 750
\$ 10	\$ 5	\$ 12.50	\$ 1	\$ 15
\$ 400	\$ 200	\$ 500	\$ 40	\$ 600

1 yard = 3 feet

1 foot = 12 inches

yd.	ft.	in.
1	1	10
+	1	11
<hr/>		
3	0	9
<hr/>		
or 2	2	21

58 in.
59 in.
117 in.



How do you feel?

yd.	ft.	in.
1	1	7
<hr/>		
x 2		
<hr/>		
2	3	2
<hr/>		
or 2	2	14

55 in.
110 in.

If the results aren't interesting
then one of us goofed!. . . . signed "GOOOOOFY"

$$\begin{array}{r} 168 \\ \times 2 \\ \hline 336 \end{array}$$

A.

$$\begin{array}{r} 378 \\ \times 2 \\ \hline 756 \end{array}$$

B.

$$\begin{array}{r} 693 \\ \times 2 \\ \hline 1386 \end{array}$$

C.

$$\begin{array}{r} 728 \\ \times 2 \\ \hline 1456 \end{array}$$

D.

$$\begin{array}{r} 48 \\ \times 7 \\ \hline 336 \end{array}$$

A.

$$\begin{array}{r} 108 \\ \times 7 \\ \hline 756 \end{array}$$

B.

$$\begin{array}{r} 112 \\ \times 3 \\ \hline 336 \end{array}$$

C.

$$\begin{array}{r} 252 \\ \times 3 \\ \hline 756 \end{array}$$

D.

$$\begin{array}{r} 462 \\ \times 3 \\ \hline 1386 \end{array}$$

A.

$$\begin{array}{r} 364 \\ \times 4 \\ \hline 1456 \end{array}$$

B.

$$\begin{array}{r} 198 \\ \times 7 \\ \hline 1386 \end{array}$$

C.

$$\begin{array}{r} 208 \\ \times 7 \\ \hline 1456 \end{array}$$

D.

$$\begin{array}{r} 84 \\ \times 4 \\ \hline 336 \end{array}$$

A.

$$\begin{array}{r} 126 \\ \times 6 \\ \hline 756 \end{array}$$

B.

$$\begin{array}{r} 154 \\ \times 9 \\ \hline 1386 \end{array}$$

C.

$$\begin{array}{r} 182 \\ \times 8 \\ \hline 1456 \end{array}$$

D.

$$\begin{array}{r} 42 \\ \times 8 \\ \hline 336 \end{array}$$

A.

$$\begin{array}{r} 84 \\ \times 9 \\ \hline 756 \end{array}$$

B.

$$\begin{array}{r} 231 \\ \times 6 \\ \hline 1386 \end{array}$$

C.

$$\begin{array}{r} 56 \\ \times 6 \\ \hline 336 \end{array}$$

D.

$$\begin{array}{r} 364 \\ \times 4 \\ \hline 1456 \end{array}$$

A.

$$\begin{array}{r} 21 \\ \times 16 \\ \hline 126 \\ 21 \\ \hline 336 \end{array}$$

B.

$$\begin{array}{r} 42 \\ \times 18 \\ \hline 336 \\ 42 \\ \hline 756 \end{array}$$

C.

$$\begin{array}{r} 63 \\ \times 12 \\ \hline 126 \\ 63 \\ \hline 756 \end{array}$$

D.

$$\begin{array}{r} 12 \\ \times 28 \\ \hline 96 \\ 24 \\ \hline 336 \end{array}$$

A.

$$\begin{array}{r} 54 \\ \times 14 \\ \hline 216 \\ 54 \\ \hline 756 \end{array}$$

B.

$$\begin{array}{r} 28 \\ \times 27 \\ \hline 196 \\ 56 \\ \hline 756 \end{array}$$

C.

$$\begin{array}{r} 112 \\ \times 13 \\ \hline 336 \\ 112 \\ \hline 1456 \end{array}$$

D.

$$\begin{array}{r} 14 \\ \times 24 \\ \hline 56 \\ 28 \\ \hline 336 \end{array}$$

A.

$$\begin{array}{r} 36 \\ \times 21 \\ \hline 36 \\ 72 \\ \hline 756 \end{array}$$

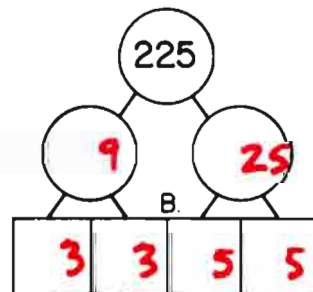
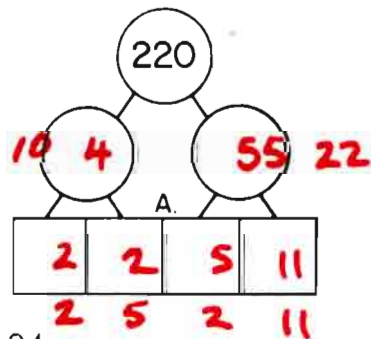
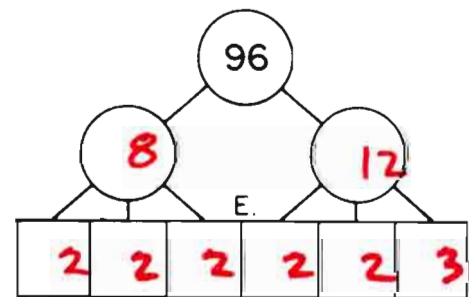
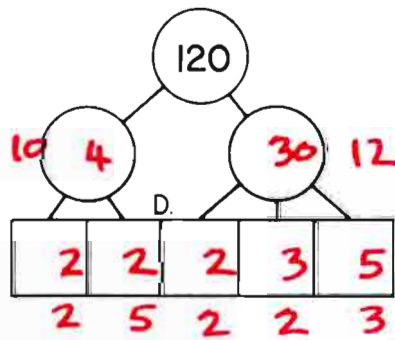
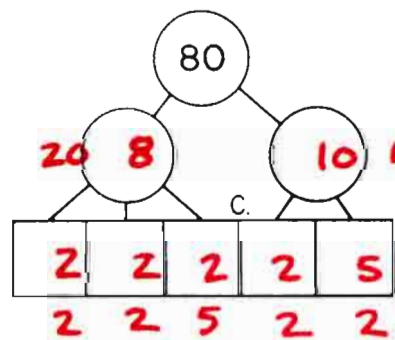
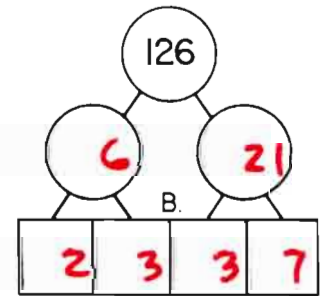
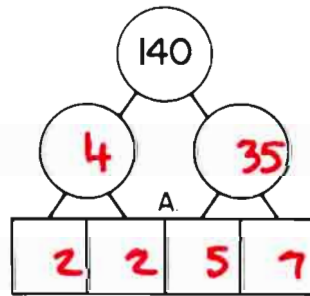
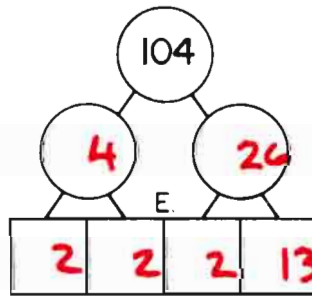
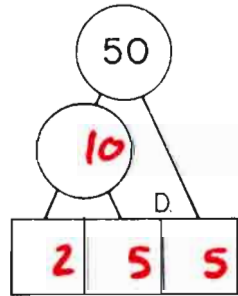
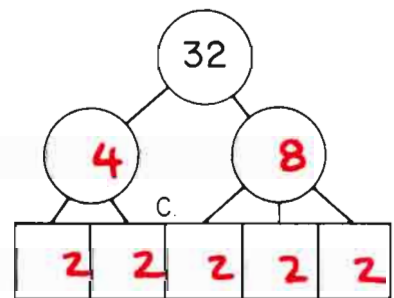
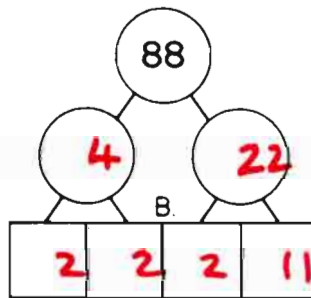
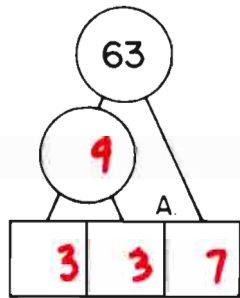
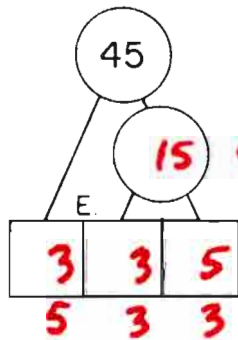
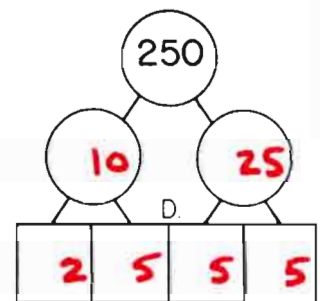
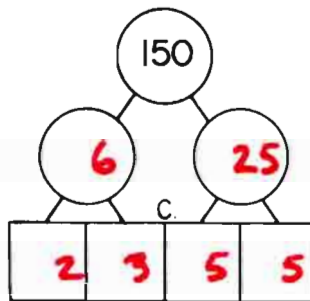
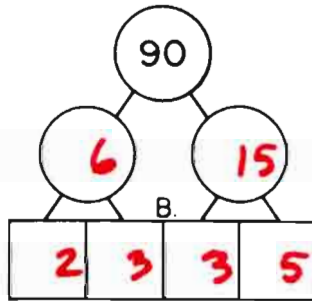
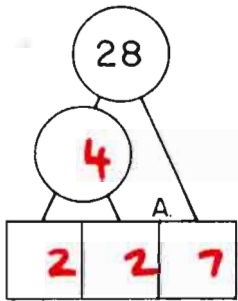
B.

$$\begin{array}{r} 104 \\ \times 14 \\ \hline 416 \\ 104 \\ \hline 1456 \end{array}$$

C.

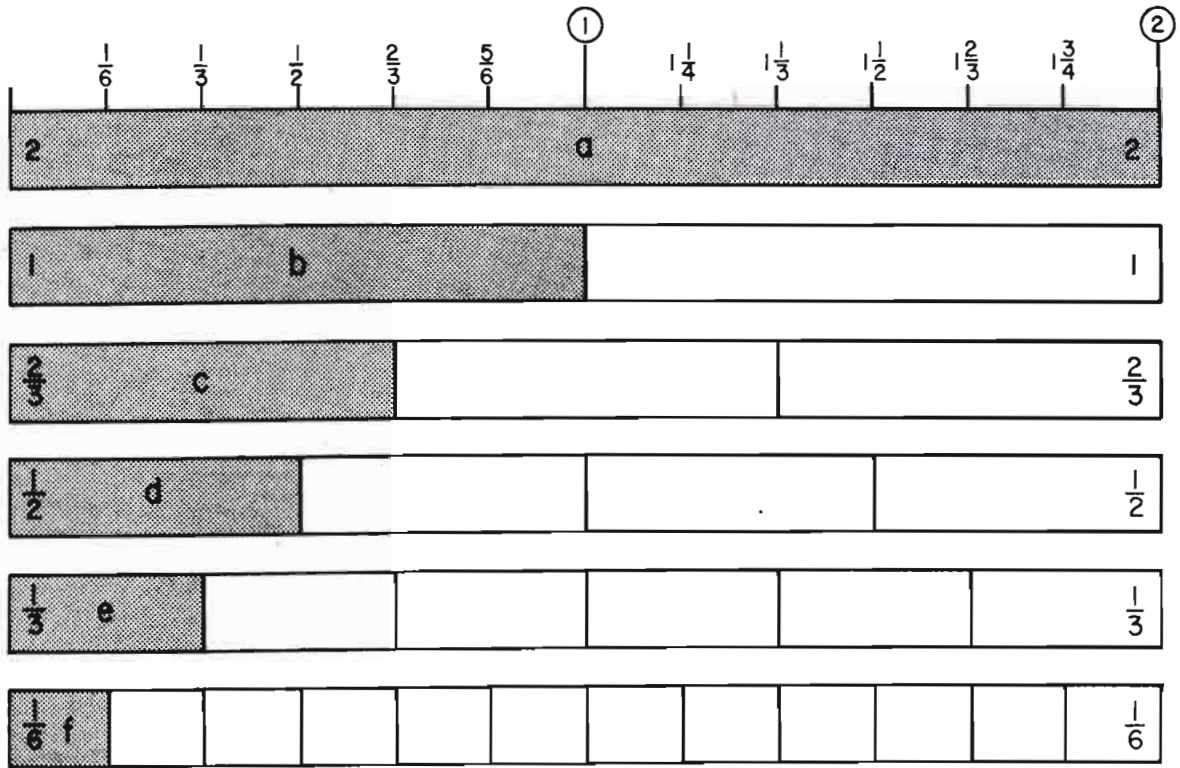
	A.	B.	C.	D.
E.	336	756	1386	1456
F.	1386	1456	336	756
G.	1456	336	756	1386
H.	756	1386	1456	336

Factor Trees (excluding 1 as a factor) . . . you may need scratch paper



A.	B.	C.	D.	E.
2,2,7	3,3,5,5	2,3,5,11	2,2 2,3,5	3,3,5
2,2,5,7	2,2,2,11	2,3,5,5	2,3,11	5,5,5,5
2,2,5,11	2,3,3,5	2,2 2,2,5	2,5,5	2,2,2,13
3,3,7	2,3,3,7	2,2 2,2,2	2,5,5,5	2,2,2 2,2,3

What Can You See?



$$\frac{b + d}{1 + \frac{1}{2}} = \frac{3d}{1\frac{1}{2}}$$

$$\frac{c + c}{A. \frac{2}{3} + \frac{2}{3} H. = \frac{2c}{1\frac{1}{3}} C.$$

$$\frac{a - e}{2 - \frac{1}{3}} = \frac{5e}{1\frac{2}{3}} A.$$

$$\frac{3d - f}{F. 1\frac{1}{2} - \frac{1}{6} B. = \frac{2e}{1\frac{1}{3}} C.$$

$$\frac{d - e}{G. \frac{1}{2} - \frac{1}{3} A. = \frac{f}{\frac{1}{6}} G.$$

$$\frac{2c + f}{C. 1\frac{1}{3} + \frac{1}{6} G. = \frac{3d}{1\frac{1}{2}} F.$$

$$\frac{3d - 3f}{F. 1\frac{1}{2} - \frac{3}{6} E. = \frac{b}{1} G.$$

$$\frac{a - 3d}{E. 2 - 1\frac{1}{2} F. = \frac{d}{\frac{1}{2}} G.$$

$$\frac{4e - 3f}{C. 1\frac{1}{3} - \frac{3}{6} E. = \frac{5f}{\frac{5}{6}} I.$$

$$\frac{c \times 3}{A. \frac{2}{3} \times 3 = \frac{a}{2}}$$

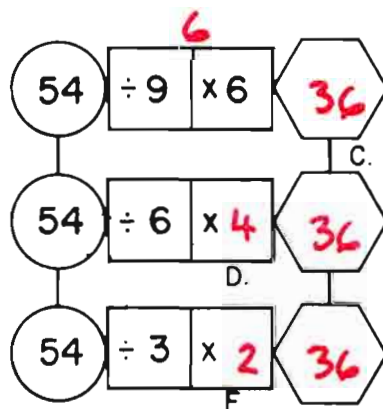
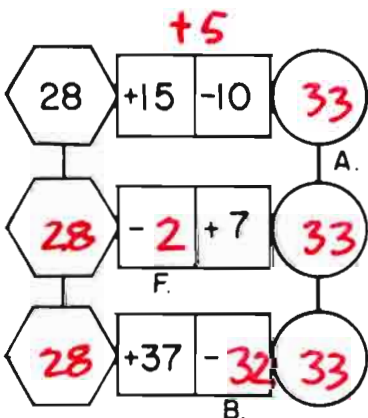
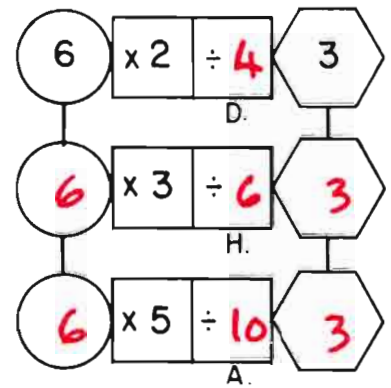
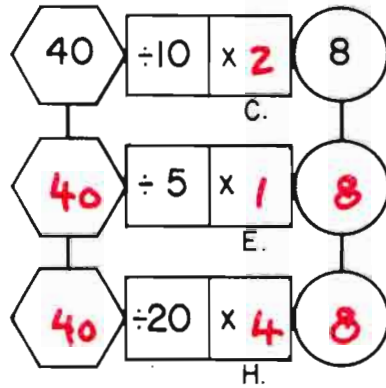
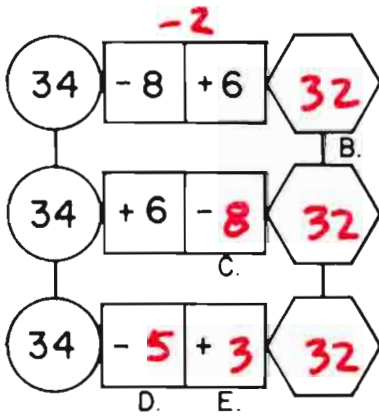
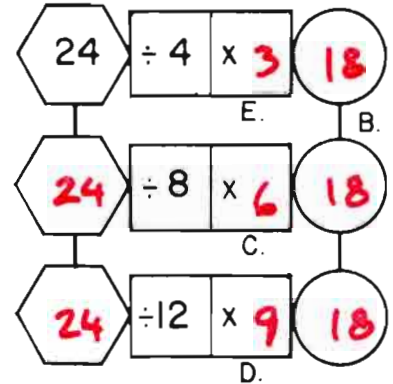
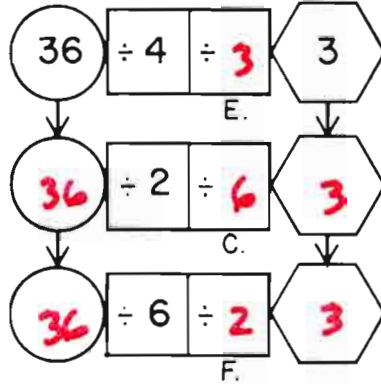
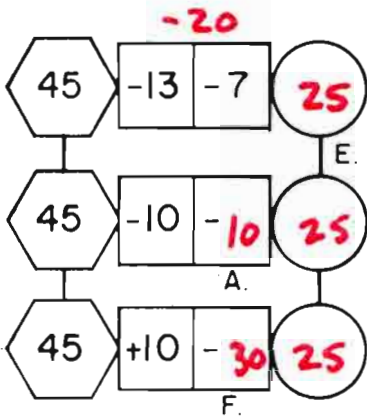
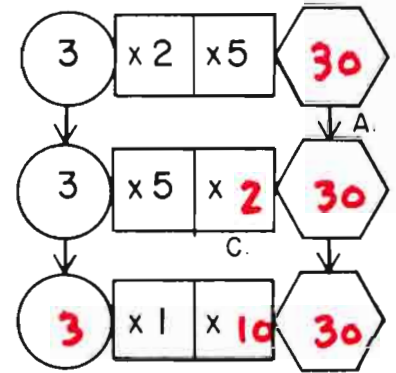
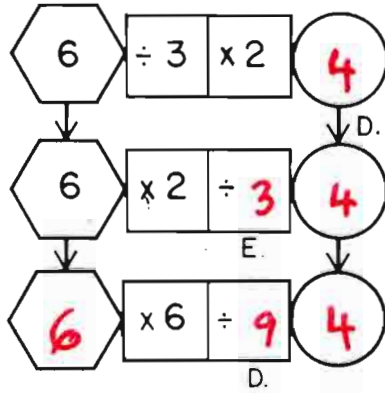
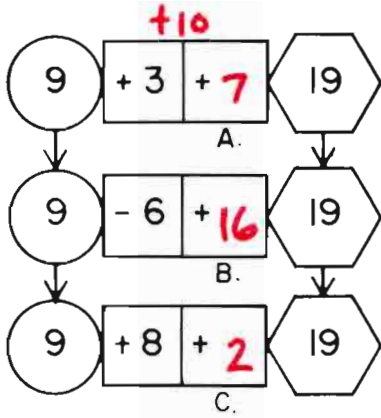
$$\frac{5e \div 2}{G. 1\frac{2}{3} \div 2 = \frac{5f}{\frac{5}{6}} C.$$

$$\frac{3d \div 3}{F. 1\frac{1}{2} \div 3 = \frac{d}{\frac{1}{2}} G.$$

$$\frac{d \times 5}{E. \frac{1}{2} \times 5 = \frac{5d}{2\frac{1}{2}} D.$$

	A.	B.	C.	D.	E.	F.
G.	$1\frac{2}{3}$	$\frac{1}{6}$	$\frac{4}{3}$	$\frac{5}{3}$	$\frac{1}{2}$	1
H.	$\frac{2}{3}$	$\frac{1}{4}$	$1\frac{1}{3}$	$\frac{5}{2}$	$\frac{3}{6}$	$1\frac{1}{2}$
I.	$\frac{1}{3}$	$\frac{3}{4}$	$\frac{5}{6}$	$2\frac{1}{2}$	2	$\frac{3}{2}$

Equal Chain Reactions



	A.	B.	C.	D.	E.
F.	30	13	2	5	25
G.	7	18	36	9	3
H.	33	32	6	4	9
I.	10	16	8	11	1

+, -, × and ÷ Measurements

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>10¢</td><td>5¢</td><td>1¢</td></tr> </table>	10¢	5¢	1¢		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>2</td><td>1</td><td>3</td></tr> </table>	2	1	3		28 ¢
10¢	5¢	1¢								
2	1	3								
+	0	1	3	8 ¢						
				36 ¢						
				36 ¢						

A.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>9¢</td><td>3¢</td><td>1¢</td></tr> </table>	9¢	3¢	1¢		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>2</td><td>2</td><td>2</td></tr> </table>	2	2	2		26 1¢
9¢	3¢	1¢								
2	2	2								
+	0	0	1	1 ¢						
				27 1¢						
				27 1¢						

B.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>\$100</td><td>\$10</td><td>\$1</td></tr> </table>	\$100	\$10	\$1		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>3</td><td>4</td><td>5</td></tr> </table>	3	4	5		\$ 345
\$100	\$10	\$1								
3	4	5								
+	4	5	6	\$ 456						
				\$ 801						
				\$ 801						

C.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>10¢</td><td>5¢</td><td>1¢</td></tr> </table>	10¢	5¢	1¢		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>2</td><td>1</td><td>3</td></tr> </table>	2	1	3		28 ¢
10¢	5¢	1¢								
2	1	3								
-	1	1	1	16 ¢						
				24 ¢						
				24 ¢						

D.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>9¢</td><td>3¢</td><td>1¢</td></tr> </table>	9¢	3¢	1¢		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>2</td><td>2</td><td>3</td></tr> </table>	2	2	3		27 1¢
9¢	3¢	1¢								
2	2	3								
-	1	0	1	10 1¢						
				17 1¢						
				17 1¢						

E.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>\$1</td><td>10¢</td><td>1¢</td></tr> </table>	\$1	10¢	1¢		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>4</td><td>3</td><td>2</td></tr> </table>	4	3	2		32 432 ¢
\$1	10¢	1¢								
4	3	2								
-	2	3	4	234 ¢						
				198 ¢						
				198 ¢						

F.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>10¢</td><td>5¢</td><td>1¢</td></tr> </table>	10¢	5¢	1¢		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>2</td><td>1</td><td>3</td></tr> </table>	2	1	3		28 ¢
10¢	5¢	1¢								
2	1	3								
x	3	x	3	x3						
				84 ¢						
				84 ¢						

G.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>9¢</td><td>3¢</td><td>1¢</td></tr> </table>	9¢	3¢	1¢		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>2</td><td>2</td><td>2</td></tr> </table>	2	2	2		26 1¢
9¢	3¢	1¢								
2	2	2								
x	2	x	2	x2						
				52 1¢						
				52 1¢						

H.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>M.</td><td>dm.</td><td>cm.</td></tr> </table>	M.	dm.	cm.		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>3</td><td>4</td><td>5</td></tr> </table>	3	4	5		345 cm.
M.	dm.	cm.								
3	4	5								
x	3	x	3	x3						
				1035 cm.						
				1035 cm.						

A.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>D.</td><td>N.</td><td>P.</td></tr> </table>	D.	N.	P.		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>4</td><td>1</td><td>3</td></tr> </table>	4	1	3		48 ¢
D.	N.	P.								
4	1	3								
÷	4	÷	4	÷4						
				12 ¢						
				12 ¢						

C.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>9¢</td><td>3¢</td><td>1¢</td></tr> </table>	9¢	3¢	1¢		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>4</td><td>2</td><td>2</td></tr> </table>	4	2	2		44 1¢
9¢	3¢	1¢								
4	2	2								
÷	4	÷	4	÷4						
				11 1¢						
				11 1¢						

G.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>100's</td><td>10's</td><td>1's</td></tr> </table>	100's	10's	1's		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>3</td><td>4</td><td>5</td></tr> </table>	3	4	5		345 1's
100's	10's	1's								
3	4	5								
÷	3	÷	3	÷3						
				115 1's						
				115 1's						

H.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>D.</td><td>N.</td><td>P.</td></tr> </table>	D.	N.	P.		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>3</td><td>1</td><td>3</td></tr> </table>	3	1	3		38 ¢
D.	N.	P.								
3	1	3								
+	1	0	2	12 ¢						
				50 ¢						
				50 ¢						

D.

<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>9¢</td><td>3¢</td><td>1¢</td></tr> </table>	9¢	3¢	1¢		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td>2</td><td>0</td><td>4</td></tr> </table>	2	0	4		21 31 1¢
9¢	3¢	1¢								
2	0	4								
-	1	1	2	14 1¢						
				17 1¢						
				17 1¢						

E.

	A.	B.	C.	D.
E.	3,1,1	1,2,2	1,2,2	2,2,3
F.	3,4,5	1,9,8	8,0,1	5,0,0
G.	5,4,3	8,0,4	1,0,2	2,0,4
H.	10,3,5	3,0,0	5,2,1	1,1,5

Estimation

. . . or "coming close" . . . with easier arithmetic.

23 x 27 = 621

-3 | -7 →

20 x 20 = 400 (-221) A.

-3 | +3 →

20 x 30 = 600 (-21) B.

+2 | +3 →

25 x 30 = 750 (+129) C.

(How close?)

Getting an exact result

$$\begin{array}{r} 27 \\ \times 23 \\ \hline 81 \\ 54 \\ \hline 621 \end{array} \text{ D.}$$

48 x 94 = 4512

+2 | +6 →

50 x 100 = 5000 (+488) A.

+2 | -4 →

50 x 90 = 4500 (-12) B.

-8 | -4 →

40 x 90 = 3600 (-912) C.

$$\begin{array}{r} 3 \\ 94 \\ \times 48 \\ \hline 752 \\ 376 \\ \hline 4512 \end{array} \text{ D.}$$

On Your Own

35 x 44 = 1540

+5 | -4 →

40 x 40 = 1600 (+60)

-5 | +6 →

30 x 50 = 1500 (-40)

-5 | -4 →

30 x 40 = 1200 (-340)

$$\begin{array}{r} 44 \\ \times 35 \\ \hline 220 \\ 132 \\ \hline 1540 \end{array} \text{ D.}$$

Taming frightfully big numbers . . .

10 x 17 = 170 A.

8 x 9 = 72 B.

100 x 10 = 1,000 C.

17 x 10 = 170 H.

80 x 9 = 720

100 x 100 = 10,000 C.

100 x 17 = 1700 B.

8 x 90 = 720

10 x 170 = 1700 G.

80 x 90 = 7,200

100 x 34 = 3400

80 x 900 = 72,000

34 x 100 = 3400

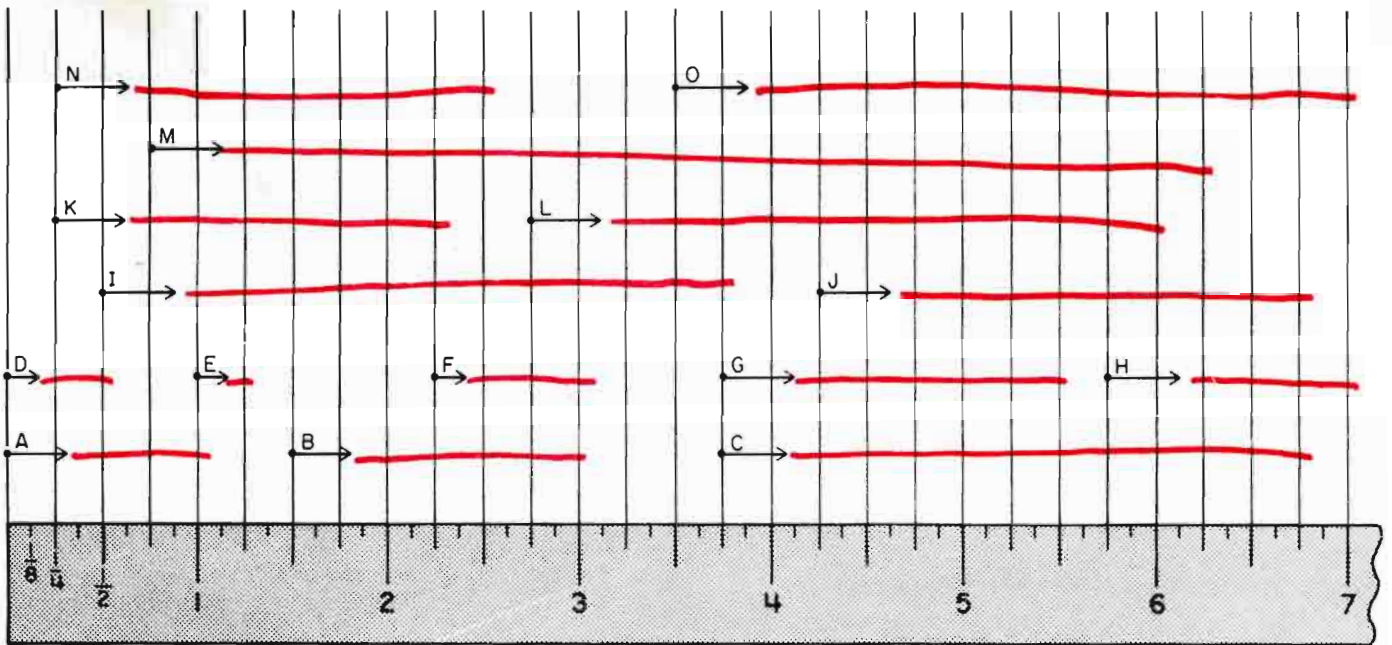
90 x 800 = 72,000

100 x 49 = 4900 A.

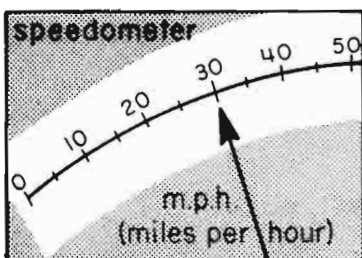
90 x 400 = 36,000 D.

	A.	B.	C.	D.
E.	4900	72	+129	36,000
F.	-221	-12	1,000	621
G.	+488	1700	-912	1540
H.	170	-21	10,000	4,512

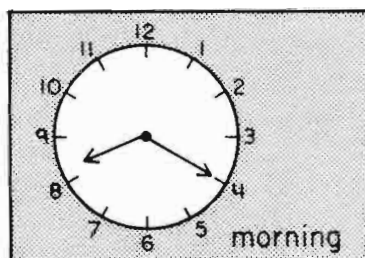
Please extend the lines to the right so they are as long as the chart below indicates.



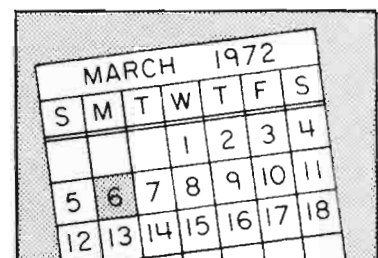
- A: $\frac{1}{4}$ in. B: $1\frac{1}{2}$ in. C: 3 in. D: $\frac{1}{2}$ in. E: $\frac{1}{4}$ in.
 F: $\frac{3}{4}$ in. G: $1\frac{3}{4}$ in. H: $1\frac{1}{4}$ in. I: $3\frac{1}{4}$ in. J: $2\frac{1}{2}$ in.
 K: 2 in. L: $3\frac{1}{4}$ in. M: $5\frac{1}{2}$ in. N: $2\frac{1}{4}$ in. O: $3\frac{1}{2}$ in.



twice the speed shown.	<u>60</u> m.p.h.
$\frac{1}{2}$ the speed shown	<u>15</u> m.p.h.
$\frac{1}{3}$ the speed shown	<u>10</u> m.p.h.
$\frac{1}{4}$ the speed shown	<u>7.5</u> m.p.h.



time shown	<u>8 : 20</u> a.m.
90 minutes later	<u>9 : 50</u> a.m.
5 hr. and 10 min. later	<u>1 : 30</u> p.m.
10 hours earlier	<u>10 : 20</u> p.m.



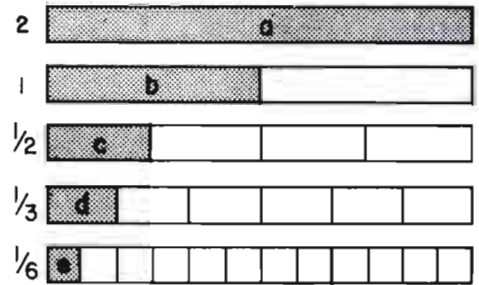
2 weeks after March 6, 1972	<u>MARCH 20, 19 72</u>
1 week before March 6, 1972	<u>FEB. 27, 19 72</u>
30 days after March 6, 1972	<u>APRIL 5, 19 72</u>
4 weeks after March 6, 1972	<u>APRIL 3, 19 72</u>

On Your Own!(V)

$$\begin{array}{r} 11 \\ 357 \\ + 246 \\ \hline 603 \\ 603 \\ 753 \\ - 468 \\ \hline 285 \end{array}$$

$$\begin{array}{r} 61 \\ 182 \\ \times 8 \\ \hline 1456 \end{array}$$

$$\begin{array}{r} 112 \\ \times 13 \\ \hline 336 \\ 112 \\ \hline 1456 \end{array}$$

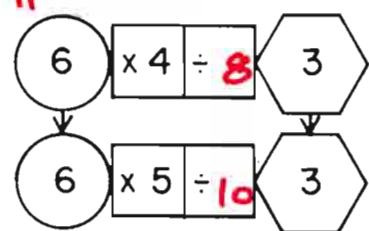
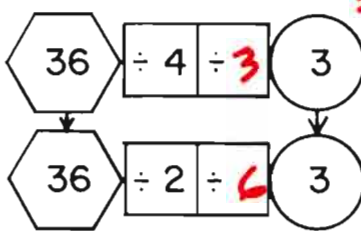
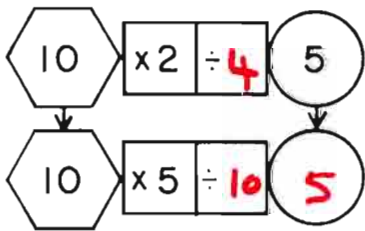
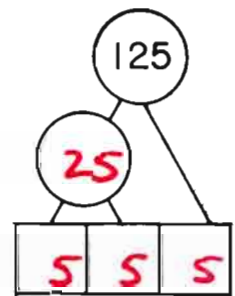
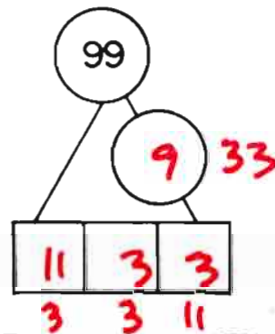
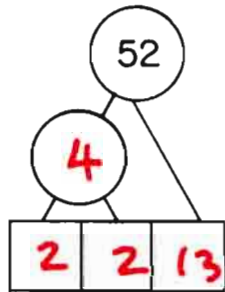
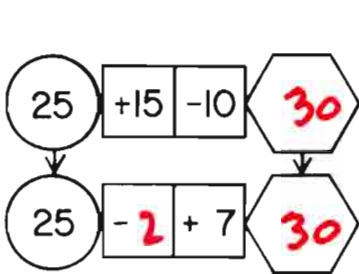


Please circle the letter after the line you think will be the best "estimate."

$35 \times 75 = 2,625$	$27 \times 54 = 1,458$
30×80 A. = 2,400	25×55 D. = 1,375
40×80 B. = 3,200	25×50 E. = 1,250
30×70 C. = 2,100	30×50 F. = 1,500

$$\begin{array}{l} b + d = 4d \\ 1 + 1/3 = 4/3 \\ 4e - d = d \\ 4/6 - 1/3 = 1/3 \\ b \div 3 = d \\ 1 \div 3 = 1/3 \end{array}$$

Equal Chain Reactions



$\begin{array}{r} 10\text{¢} \quad 5\text{¢} \quad 1\text{¢} \\ 3 \quad \quad 4 \\ + 1 \quad \quad 0 \quad \quad 2 \\ \hline 5 \quad \quad 0 \quad \quad 1 \quad \quad 6 \end{array}$	$\begin{array}{r} 1 \\ 39 \text{¢} \\ 12 \text{¢} \\ \hline 51 \text{¢} \end{array}$
---	--

$\begin{array}{r} 10\text{¢} \quad 5\text{¢} \quad 1\text{¢} \\ 4 \quad \quad 1 \quad \quad 5 \\ - 2 \quad \quad 1 \quad \quad 3 \\ \hline 2 \quad \quad 0 \quad \quad 2 \end{array}$	$\begin{array}{r} 4 \\ 80 \text{¢} \\ 28 \text{¢} \\ \hline 22 \text{¢} \end{array}$
---	--



How do you feel?

If the results aren't interesting
then one of us goofed! . . . signed "GOOOOOFY"

$$\begin{array}{r} 432 \\ \times 8 \\ \hline \end{array}$$

3456

$$\begin{array}{r} 648 \\ \times 7 \\ \hline \end{array}$$

4536

$$\begin{array}{r} 727 \\ \times 9 \\ \hline \end{array}$$

6543

$$\begin{array}{r} 1059 \\ \times 6 \\ \hline \end{array}$$

6354

$$\begin{array}{r} 576 \\ \times 6 \\ \hline \end{array}$$

3456

$$\begin{array}{r} 288 \\ \times 12 \\ \hline \end{array}$$

3456

$$\begin{array}{r} 96 \\ \times 36 \\ \hline \end{array}$$

3456

$$\begin{array}{r} 192 \\ \times 18 \\ \hline \end{array}$$

3456

$$\begin{array}{r} 297 \\ \times 19 \\ \hline \end{array}$$

5643

$$\begin{array}{r} 165 \\ \times 21 \\ \hline \end{array}$$

3465

$$\begin{array}{r} 64 \\ \times 54 \\ \hline \end{array}$$

3456

$$\begin{array}{r} 143 \\ \times 45 \\ \hline \end{array}$$

6435

$$\begin{array}{r} 149 \\ \times 36 \\ \hline \end{array}$$

5364

$$\begin{array}{r} 72 \\ \times 63 \\ \hline \end{array}$$

4536

$$\begin{array}{r} 99 \\ \times 65 \\ \hline \end{array}$$

6435

Can you find other examples that belong to this family?

$$\begin{array}{r} 144 \\ \times 24 \\ \hline \end{array}$$

3456

$$\begin{array}{r} 99 \\ \times 35 \\ \hline \end{array}$$

3465

$$\begin{array}{r} 288 \\ \times 12 \\ \hline \end{array}$$

3456

$$\begin{array}{r} 48 \\ \times 72 \\ \hline \end{array}$$

3456

$$\begin{array}{r} 203 \\ \times 18 \\ \hline \end{array}$$

3654

Pairs of Single-Digit Whole Number Factors.

Rule: if not alike, please write the larger factor above the smaller factor.

$\begin{array}{r} 6 \\ \times 5 \\ \hline 30 \end{array}$ A.	$\begin{array}{r} 7 \\ \times 7 \\ \hline 49 \end{array}$ B.	$\begin{array}{r} 7 \\ \times 5 \\ \hline 35 \end{array}$ C.	$\begin{array}{r} 9 \\ \times 7 \\ \hline 63 \end{array}$ D.	$\begin{array}{r} 8 \\ \times 6 \\ \hline 48 \end{array}$ E.	$\begin{array}{r} 8 \\ \times 4 \\ \hline 32 \end{array}$ F.	$\begin{array}{r} 9 \\ \times 8 \\ \hline 72 \end{array}$ A.	$\begin{array}{r} 8 \\ \times 5 \\ \hline 40 \end{array}$	$\begin{array}{r} 7 \\ \times 5 \\ \hline 35 \end{array}$ C.	$\begin{array}{r} 9 \\ \times 9 \\ \hline 81 \end{array}$ B.
$\begin{array}{r} 7 \\ \times 6 \\ \hline 54 \end{array}$	$\begin{array}{r} 8 \\ \times 8 \\ \hline 64 \end{array}$ D.	$\begin{array}{r} 8 \\ \times 5 \\ \hline 40 \end{array}$	$\begin{array}{r} 9 \\ \times 4 \\ \hline 36 \end{array}$ E.	$\begin{array}{r} 6 \\ \times 6 \\ \hline 36 \end{array}$ F.	$\begin{array}{r} 7 \\ \times 7 \\ \hline 49 \end{array}$ B.	$\begin{array}{r} 7 \\ \times 6 \\ \hline 42 \end{array}$ D.	$\begin{array}{r} 8 \\ \times 7 \\ \hline 56 \end{array}$	$\begin{array}{r} 9 \\ \times 7 \\ \hline 63 \end{array}$ D.	$\begin{array}{r} 8 \\ \times 6 \\ \hline 48 \end{array}$ E.
$\begin{array}{r} 9 \\ \times 8 \\ \hline 72 \end{array}$ A.	$\begin{array}{r} 7 \\ \times 6 \\ \hline 42 \end{array}$ D.	$\begin{array}{r} 9 \\ \times 5 \\ \hline 45 \end{array}$ F.	$\begin{array}{r} 8 \\ \times 7 \\ \hline 56 \end{array}$	$\begin{array}{r} 9 \\ \times 9 \\ \hline 81 \end{array}$ B.	$\begin{array}{r} 6 \\ \times 5 \\ \hline 30 \end{array}$ A.	$\begin{array}{r} 9 \\ \times 5 \\ \hline 45 \end{array}$ I.	$\begin{array}{r} 7 \\ \times 6 \\ \hline 54 \end{array}$	$\begin{array}{r} 8 \\ \times 4 \\ \hline 32 \end{array}$ F.	$\begin{array}{r} 8 \\ \times 8 \\ \hline 64 \end{array}$ D.

$10 \times 1 = 10$	$8 \times 7 = 56$ G.	$5 \times 8 = 40$
$10 \times 10 = 100$ A.	$80 \times 7 = 560$ A.	$5 \times 80 = 400$ I.
$10 \times 100 = 1,000$ B.	$80 \times 70 = 5,600$ H.	$50 \times 8 = 400$ C.
$100 \times 100 = 10,000$ K.	$8 \times 700 = 5,600$ E.	$50 \times 80 = 4,000$
$100 \times 1000 = 100,000$ H.	$80 \times 700 = 56,000$ A.	$50 \times 800 = 40,000$
$1000 \times 100 = 100,000$ D.	$800 \times 700 = 560,000$ G.	$500 \times 800 = 400,000$ B.

63

42

81

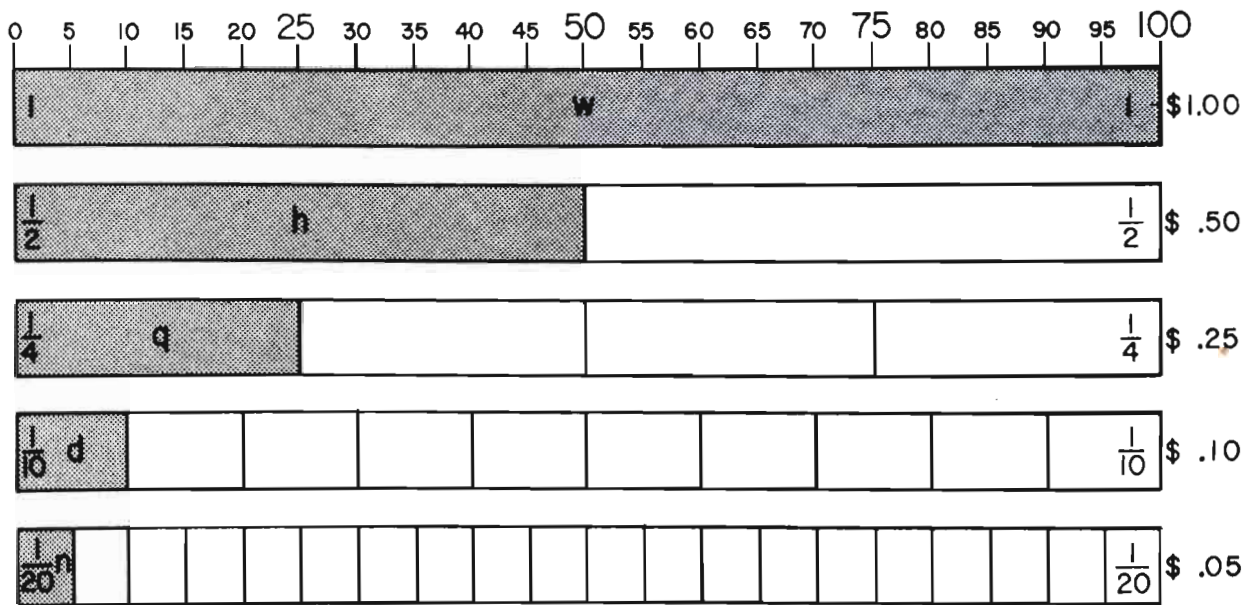
48

45

54

	A.	B.	C.	D.	E.	F.
G.	100	9,9	560,000	56	6,8	6,6
H.	5,6	400,000	6,4	100,000	5,600	4,8
I.	560	7,7	400	8,8	2,3,3,3	5,9
J.	56,000	3,3,7	5,7	6,7	4,9	3,3,3,3
K.	8,9	1,000	10,000	7,9	200	3,2,2,2,2

What Can You See?



$$\frac{3h}{\frac{3}{2}} - \frac{3q}{\frac{3}{4}} = \frac{3q}{\frac{3}{4}} \text{ A.}$$

$$\frac{2ln}{\frac{21}{20}} - \frac{h}{\frac{1}{2}} = \frac{11n}{\frac{11}{20}} \text{ B.}$$

$$\frac{5q}{\frac{5}{4}} - \frac{7n}{\frac{7}{20}} = \frac{9d}{\frac{9}{10}} \text{ C.}$$

$$\frac{3d}{\frac{3}{10}} + \frac{8d}{\frac{8}{10}} = \frac{11d}{\frac{11}{10}} \text{ D.}$$

$$\frac{3h}{\frac{3}{2}} + \frac{3h}{\frac{3}{2}} = \frac{3w}{3} \text{ I.}$$

$$\frac{11d}{\frac{11}{10}} + \frac{2ln}{\frac{21}{20}} = \frac{43n}{\frac{43}{20}} \text{ F.}$$

$$\frac{3q}{\frac{3}{4}} - \frac{1d}{\frac{1}{10}} = \frac{13n}{\frac{13}{20}} \text{ A.}$$

$$\frac{13n}{\frac{13}{20}} + \frac{3h}{\frac{3}{2}} = \frac{43n}{\frac{43}{20}} \text{ I.}$$

$$\frac{2w}{2} - \frac{9d}{\frac{9}{10}} = \frac{11d}{\frac{11}{10}} \text{ H.}$$

$$\frac{7d}{\frac{7}{10}} \times \frac{3}{3} = \frac{21d}{\frac{21}{10}} \text{ H.}$$

$$\frac{3q}{\frac{3}{4}} \times \frac{4}{4} = \frac{3w}{3} \text{ G.}$$

$$\frac{3h}{\frac{3}{2}} \times \frac{4}{4} = \frac{6w}{6} \text{ C.}$$

$$\frac{2w}{2} \div \frac{8}{8} = \frac{8}{\frac{8}{4}} \text{ D.}$$

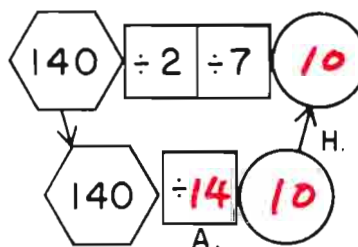
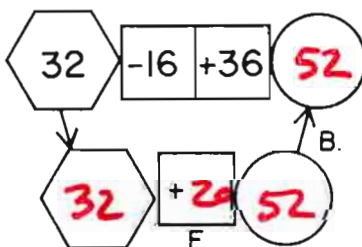
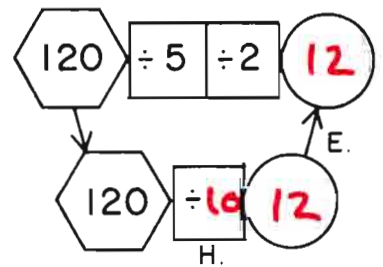
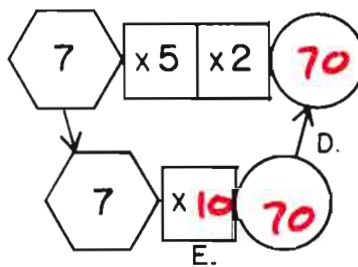
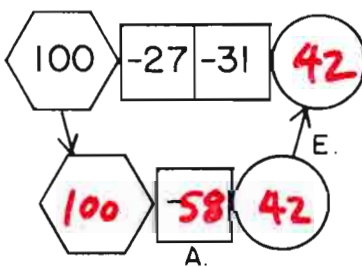
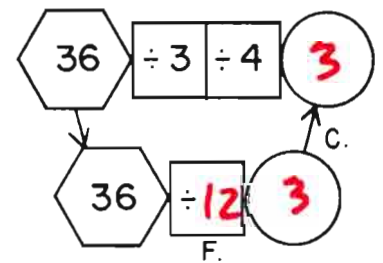
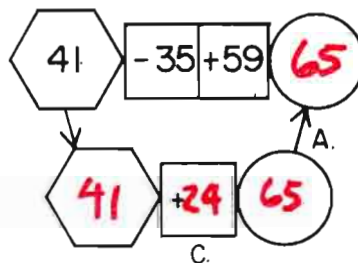
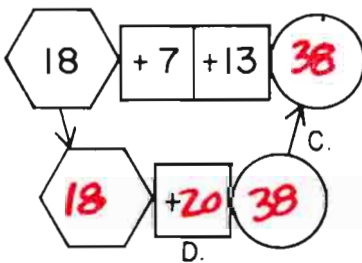
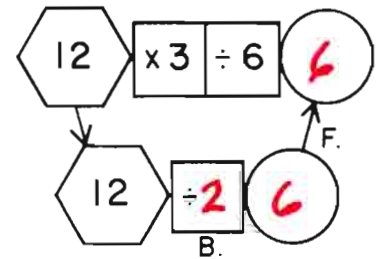
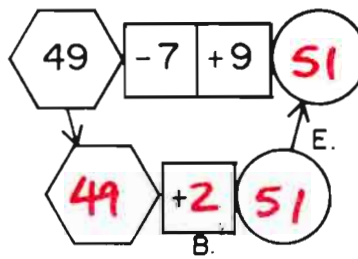
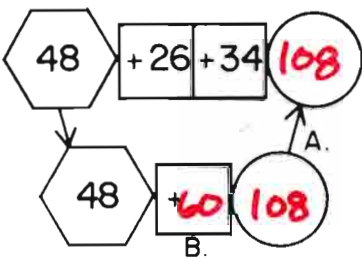
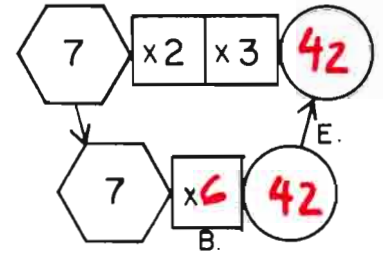
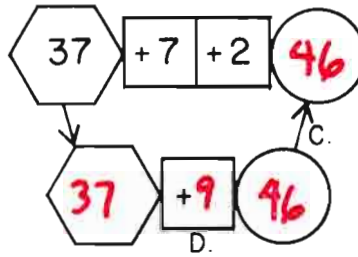
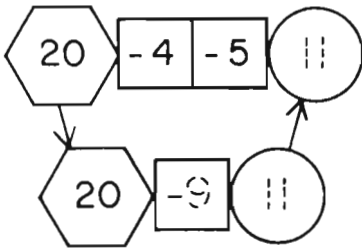
$$\frac{9d}{\frac{9}{10}} \div \frac{6}{6} = \frac{3n}{\frac{3}{20}} \text{ E.}$$

$$\frac{3h}{\frac{3}{2}} \div \frac{15}{15} = \frac{d}{\frac{1}{10}} \text{ F.}$$

$$\frac{3q}{\frac{3}{4}} \div \frac{5}{5} = \frac{3n}{\frac{3}{20}} \text{ I.}$$

	A.	B.	C.	D.	E.	F.
G.	$\frac{1}{20}$	$\frac{11}{20}$	$\frac{21}{20}$	$\frac{1}{4}$	3	$\frac{7}{10}$
H.	$\frac{3}{4}$	$2\frac{1}{10}$	6	$1\frac{1}{10}$	2	$2\frac{3}{20}$
I.	$\frac{13}{20}$	$\frac{3}{2}$	$\frac{9}{10}$	$1\frac{1}{2}$	$\frac{3}{20}$	$\frac{1}{10}$

Chain Reactions . . . and Shortcuts



	A.	B.	C.	D.	E.
F.	65	6	46	20	12
G.	-58	60	3	70	51
H.	14	52	38	7	10
I.	108	2	24	9	42

+, -, × and ÷ Measurements

1 yard = 3 feet

1 foot = 12 inches

	25¢	5¢	1¢	
		2	3	
	1	2	3	
	+	1	2	3
	3	0	1	
	A.			

yd.	ft.	in.	
	2	8	
1	2	8	
+	2	1	3
4	0	11	
B.			

\$100	\$10	\$1	
	5	6	7
5	6	7	
+	3	4	5
9	1	2	
C.			

	25¢	5¢	1¢	
	4	0	0	
		2	3	
	4	0	0	
	-	1	2	3
	2	2	2	
	D.			

yd.	ft.	in.	
	2	2	
2	2	2	
-	1	0	10
1	1	4	
E.			

\$1	10¢	1¢	
	5	4	3
5	4	3	
-	3	4	5
1	9	8	
F.			

Q.	N.	P.	
	2	3	
1	2	3	
	x	3	
4	2	4	
G.			

yd.	ft.	in.	
	1	7	
1	1	7	
	x	4	
6	0	4	
H.			

M.	dm.	cm.	
	2	3	4
2	3	4	
	x	4	
9	3	6	
A.			

Q.	N.	P.	
	2	2	0
2	2	0	
	÷	6	
0	2	0	
C.			

yd.	ft.	in.	
	3	0	0
3	0	0	
	÷	4	
0	2	3	
C.			

100's	10's	1's	
	2	2	2
2	2	2	
	÷	3	
0	7	4	
D.			

Q.	N.	P.	
	2	2	2
2	2	2	
+	1	2	3
4	0	0	
D.			

yd.	ft.	in.	
	4	0	0
4	0	0	
-	1	2	11
2	0	1	
E.			

	A.	B.	C.	D.
E.	4,5,6	1,1,4	2,0,1	4,0,0
F.	3,0,1	0,2,2	1,9,8	2,2,2
G.	9,3,6	4,0,11	0,2,3	4,2,4
H.	6,0,4	1,2,3	9,1,2	0,7,4

Estimation

. . . or "coming close" . . . with easier arithmetic.

$585 \div 13 = 45$

+15	-3	→	$600 \div 10 = 60$	(+15) A.
+15	+2	→	$600 \div 15 = 40$	(-5) B.
-85	-3	→	$500 \div 10 = 50$	(+5) C.

(How close?)

Getting an exact result

$$13 \overline{) 585} \begin{array}{r} 45 \\ \underline{52} \\ 65 \\ \underline{65} \end{array}$$

$459 \div 27 = 17$

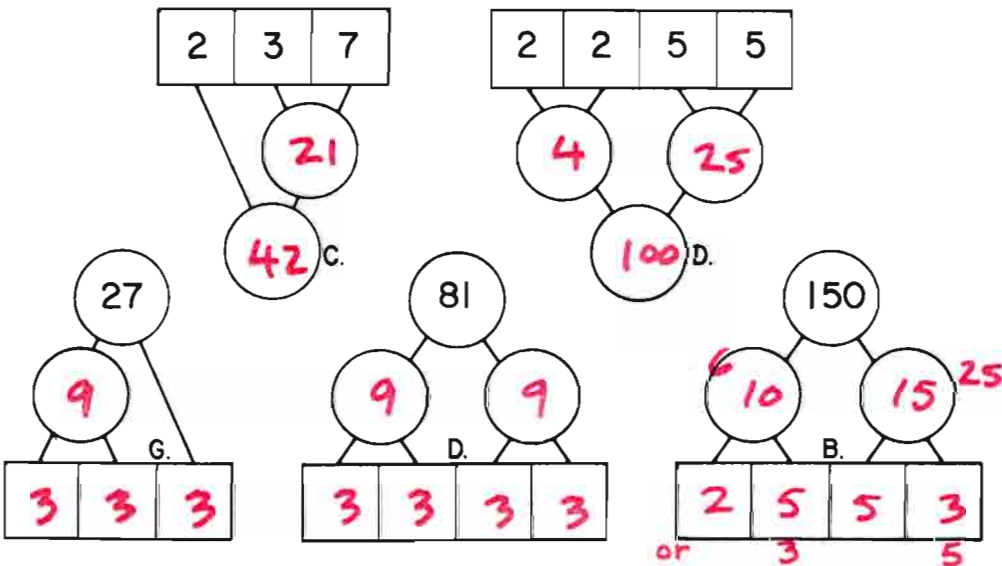
-9	+3	→	$450 \div 30 = 15$	(-2) A.
+4	+3	→	$500 \div 30 = 16\frac{2}{3}$	(- $\frac{1}{3}$) B.
-9	-2	→	$450 \div 25 = 18$	(+1) C.

$$27 \overline{) 459} \begin{array}{r} 17 \\ \underline{271} \\ 189 \\ \underline{189} \end{array}$$

$2025 \div 45 = 45$

-25	-5	→	$2000 \div 40 = 50$	(+5) C.
-25	+5	→	$2000 \div 50 = 40$	(-5) B.
÷5	÷5	→	$405 \div 9 = 45$	(0) A.

$$45 \overline{) 2025} \begin{array}{r} 45 \\ \underline{180} \\ 225 \\ \underline{225} \end{array}$$



Factor Trees (excluding 1 as a factor)

	A.	B.	C.	D.
E.	6	$-\frac{1}{3}$	+5	100
F.	+15	9	+1	17
G.	0	-5	3,3,3	3,3,3,3
H.	-2	$\frac{2,5}{5,3}$	42	45

Please indicate the largest amount with an A in the tinted block; the next largest amount with a B, the next with a C, and the smallest with a D.

An hour and a half **90** **A**
 Three quarters of an hour **45** **D**
 Seventy minutes **70** **C**
 An hour and a quarter **75** **B**

Two pounds, 10 ounces **42** **B**
 Two and a half pounds **40** **C**
 Two and $\frac{3}{4}$ pounds **44** **A**
 Two ounces **2** **D**

Please find the difference in minutes between:

A and B: $\frac{15}{c}$ min. A and C: $\frac{20}{d}$ min.
 A and D: $\frac{45^a}{c}$ min. B and C: $\frac{5}{d}$ min.
 B and D: $\frac{30^b}{c}$ min. C and D: $\frac{25^e}{a}$ min.

Please find the difference in ounces between:

A and B: $\frac{2}{d}$ oz. A and C: $\frac{4}{j}$ oz.
 A and D: $\frac{42^b}{d}$ oz. B and C: $\frac{2^e}{j}$ oz.
 B and D: $\frac{40^c}{d}$ oz. C and D: $\frac{38^f}{j}$ oz.

Twenty inches **20** **B**
 Two feet **24** **A**
 One foot, 7 inches **19** **C**
 Three fourth of a foot **9** **D**

Seventeen dimes **170** **C**
 Twenty-five nickels **125** **D**
 Two and a half dollars **250** **A**
 Two hundred pennies **200** **B**

Please find the difference in inches between:

A and B: $\frac{4}{b}$ in. A and C: $\frac{5}{e}$ in.
 A and D: $\frac{15^e}{a}$ in. B and C: $\frac{1}{e}$ in.
 B and D: $\frac{11^a}{b}$ in. C and D: $\frac{10^k}{c}$ in.

Please find the difference in cents between:

A and B: $\frac{50}{c}$ ¢ A and C: $\frac{80}{d}$ ¢
 A and D: $\frac{125^a}{c}$ ¢ B and C: $\frac{30^d}{c}$ ¢
 B and D: $\frac{75^b}{c}$ ¢ C and D: $\frac{45^e}{b}$ ¢



amount shown	72 ¢	a.
half as much	36 ¢	b.
one third as much	24 ¢	c.
one fourth as much	18 ¢	d.
one sixth as much	12 ¢	e.

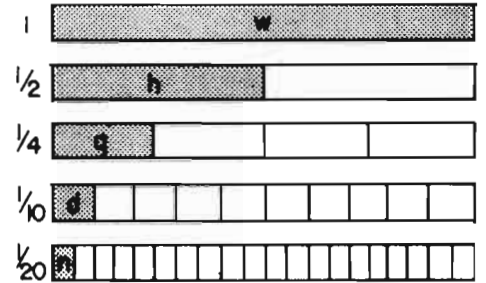
	a.	b.	c.	d.	e.
f.	25	36	75	18	2
g.	15	11	10	20	12
h.	72	125	30	1	4
i.	50	45	24	80	5
j.	38	2	42	40	4
k.	14	1	27	30	17

On Your Own (VI)

$$\begin{array}{r} 26 \\ 727 \\ \times 9 \\ \hline 6543 \end{array}$$

$$\begin{array}{r} 24 \\ 148 \\ 148 \\ 148 \\ 148 \\ 148 \\ + 148 \\ \hline 888 \end{array}$$

$$\begin{array}{r} 185 \\ \times 24 \\ \hline 740 \\ 370 \\ \hline 4440 \end{array}$$

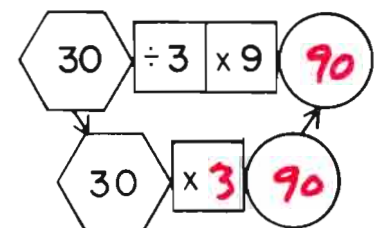
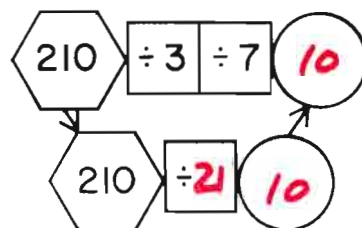
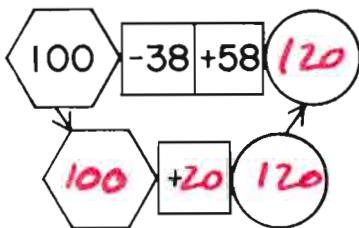
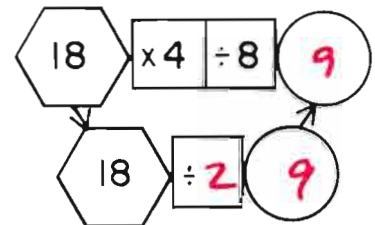
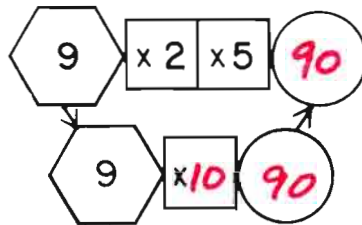
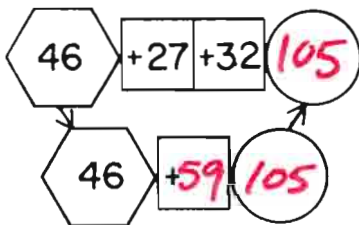


Please circle the letter after the line you think will be the best "estimate."

$575 \div 35 = 16.4$	$2511 \div 55 = 45.65$
$500 \div 40$ A. = 12.5	$3000 \div 50$ D. = 60
$600 \div 40$ B. = 15	$2000 \div 50$ E. = 40
$600 \div 30$ C. = 20	$2000 \div 60$ F. = 33.3

$$\begin{array}{l} 3h - 3q = 3q \\ 3/2 - 3/4 = 3/4 \\ \text{or } w + 3d \\ 2w - 7d = 13d \\ 2 - 7/10 = 13/10 \\ 3h \div 15 = d \\ 1/2 \div 15 = 1/10 \end{array}$$

Chain Reactions . . . and Shortcuts



How do you feel?

$\begin{array}{r} 25\text{¢} \ 10\text{¢} \ 5\text{¢} \\ 3 \ 4 \ 5 \\ 4 \ 0 \ 0 \\ - 1 \ 4 \ 2 \\ \hline 2 \ 0 \ 3 \end{array}$	$\begin{array}{r} 100 \text{ ¢} \\ 47 \text{ ¢} \\ \hline 53 \text{ ¢} \end{array}$
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$\begin{array}{r} 25\text{¢} \ 10\text{¢} \ 5\text{¢} \\ 2 \ 3 \ 4 \\ \times 3 \\ \hline 8 \ 1 \ 2 \\ \text{or } 6 \ 9 \ 12 \end{array}$	$\begin{array}{r} 100 \text{ ¢} \\ 69 \text{ ¢} \\ \times 3 \\ \hline 207 \text{ ¢} \end{array}$
--	--

If the results aren't interesting
then one of us goofed! signed "GOOOOOFY"

$$\begin{array}{r} 7 \\ \times 3 \\ \hline 21 \end{array}$$

A.

$$\begin{array}{r} 195 \\ \times 2 \\ \hline 390 \end{array}$$

A.

$$\begin{array}{r} 63 \\ \times 2 \\ \hline 126 \end{array}$$

A.

$$\begin{array}{r} 378 \\ \times 4 \\ \hline 1512 \end{array}$$

D.

$$\begin{array}{r} 108 \\ \times 9 \\ \hline 972 \end{array}$$

D.

$$\begin{array}{r} 154 \\ \times 8 \\ \hline 1232 \end{array}$$

$$\begin{array}{r} 105 \\ \times 2 \\ \hline 210 \end{array}$$

B.

$$\begin{array}{r} 130 \\ \times 3 \\ \hline 390 \end{array}$$

E.

$$\begin{array}{r} 42 \\ \times 3 \\ \hline 126 \end{array}$$

G.

$$\begin{array}{r} 243 \\ \times 4 \\ \hline 972 \end{array}$$

E.

$$\begin{array}{r} 308 \\ \times 4 \\ \hline 1232 \end{array}$$

$$\begin{array}{r} 216 \\ \times 7 \\ \hline 1512 \end{array}$$

G.

$$\begin{array}{r} 42 \\ \times 5 \\ \hline 210 \end{array}$$

E.

$$\begin{array}{r} 65 \\ \times 6 \\ \hline 390 \end{array}$$

A.

$$\begin{array}{r} 18 \\ \times 7 \\ \hline 126 \end{array}$$

A.

$$\begin{array}{r} 176 \\ \times 7 \\ \hline 1232 \end{array}$$

$$\begin{array}{r} 168 \\ \times 9 \\ \hline 1512 \end{array}$$

D.

$$\begin{array}{r} 162 \\ \times 6 \\ \hline 972 \end{array}$$

D.

$$\begin{array}{r} 35 \\ \times 6 \\ \hline 210 \end{array}$$

B.

$$\begin{array}{r} 78 \\ \times 5 \\ \hline 390 \end{array}$$

E.

$$\begin{array}{r} 14 \\ \times 9 \\ \hline 126 \end{array}$$

G.

$$\begin{array}{r} 54 \\ \times 28 \\ \hline 432 \\ 108 \\ \hline 1512 \end{array}$$

G.

$$\begin{array}{r} 42 \\ \times 36 \\ \hline 252 \\ 126 \\ \hline 1512 \end{array}$$

D.

$$\begin{array}{r} 15 \\ \times 14 \\ \hline 60 \\ 15 \\ \hline 210 \end{array}$$

E.

$$\begin{array}{r} 325 \\ \times 12 \\ \hline 650 \\ 325 \\ \hline 3900 \end{array}$$

B.

$$\begin{array}{r} 36 \\ \times 35 \\ \hline 180 \\ 108 \\ \hline 1260 \end{array}$$

B.

$$\begin{array}{r} 36 \\ \times 27 \\ \hline 252 \\ 72 \\ \hline 972 \end{array}$$

E.

$$\begin{array}{r} 18 \\ \times 54 \\ \hline 72 \\ 90 \\ \hline 972 \end{array}$$

D.

$$\begin{array}{r} 75 \\ \times 28 \\ \hline 600 \\ 150 \\ \hline 2100 \end{array}$$

C.

$$\begin{array}{r} 156 \\ \times 25 \\ \hline 780 \\ 312 \\ \hline 3900 \end{array}$$

G.

$$\begin{array}{r} 225 \\ \times 56 \\ \hline 1350 \\ 1125 \\ \hline 12600 \end{array}$$

C.

	A.	B.	C.	D.
E.	390	210	6300	972
F.	21	1260	12600	135
G.	126	3900	2100	1512

Pairs of Single-Digit Whole Number Factors

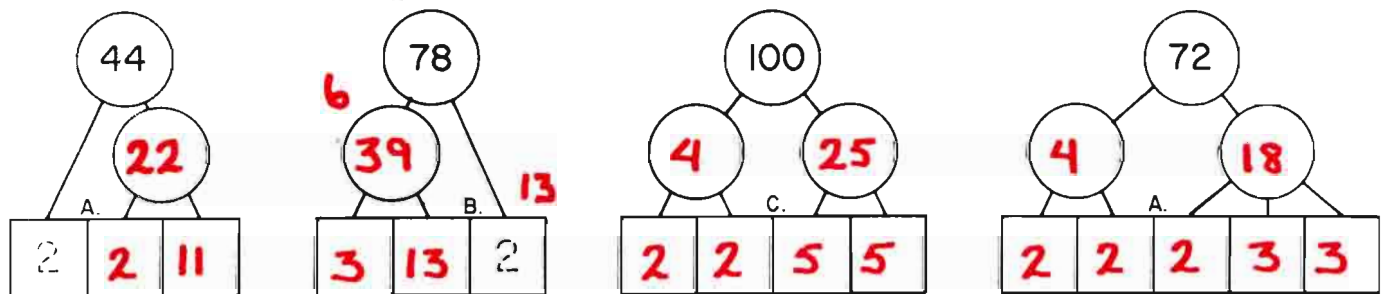
Rule: if not alike, please write the larger factor above the smaller factor.

$\begin{array}{r} 6^E \\ \times 2 \\ \hline 12 \end{array}$	$\begin{array}{r} 9^A \\ \times 9 \\ \hline 81 \end{array}$	$\begin{array}{r} 7^F \\ \times 2 \\ \hline 14 \end{array}$	$\begin{array}{r} 9^B \\ \times 8 \\ \hline 72 \end{array}$	$\begin{array}{r} 8^F \\ \times 2 \\ \hline 16 \end{array}$	$\begin{array}{r} 9^C \\ \times 7 \\ \hline 63 \end{array}$	$\begin{array}{r} 9 \\ \times 2 \\ \hline 18 \end{array}$	$\begin{array}{r} 9^D \\ \times 6 \\ \hline 54 \end{array}$	$\begin{array}{r} 5 \\ \times 4 \\ \hline 20 \end{array}$	$\begin{array}{r} 8^E \\ \times 6 \\ \hline 48 \end{array}$
$\begin{array}{r} 8 \\ \times 3 \\ \hline 24 \end{array}$	$\begin{array}{r} 7^F \\ \times 6 \\ \hline 42 \end{array}$	$\begin{array}{r} 5 \\ \times 5 \\ \hline 25 \end{array}$	$\begin{array}{r} 6^G \\ \times 6 \\ \hline 36 \end{array}$	$\begin{array}{r} 9 \\ \times 3 \\ \hline 27 \end{array}$	$\begin{array}{r} 8^H \\ \times 4 \\ \hline 32 \end{array}$	$\begin{array}{r} 6^I \\ \times 5 \\ \hline 30 \end{array}$	$\begin{array}{r} 7 \\ \times 4 \\ \hline 28 \end{array}$	$\begin{array}{r} 9^J \\ \times 4 \\ \hline 36 \end{array}$	$\begin{array}{r} 6 \\ \times 4 \\ \hline 24 \end{array}$
$\begin{array}{r} 8^K \\ \times 5 \\ \hline 40 \end{array}$	$\begin{array}{r} 7 \\ \times 3 \\ \hline 21 \end{array}$	$\begin{array}{r} 9^A \\ \times 5 \\ \hline 45 \end{array}$	$\begin{array}{r} 6 \\ \times 3 \\ \hline 18 \end{array}$	$\begin{array}{r} 7^B \\ \times 7 \\ \hline 49 \end{array}$	$\begin{array}{r} 4 \\ \times 4 \\ \hline 16 \end{array}$	$\begin{array}{r} 8^C \\ \times 7 \\ \hline 56 \end{array}$	$\begin{array}{r} 5 \\ \times 3 \\ \hline 15 \end{array}$	$\begin{array}{r} 8^D \\ \times 8 \\ \hline 64 \end{array}$	$\begin{array}{r} 4 \\ \times 3 \\ \hline 12 \end{array}$

Taming frightfully big numbers . . .

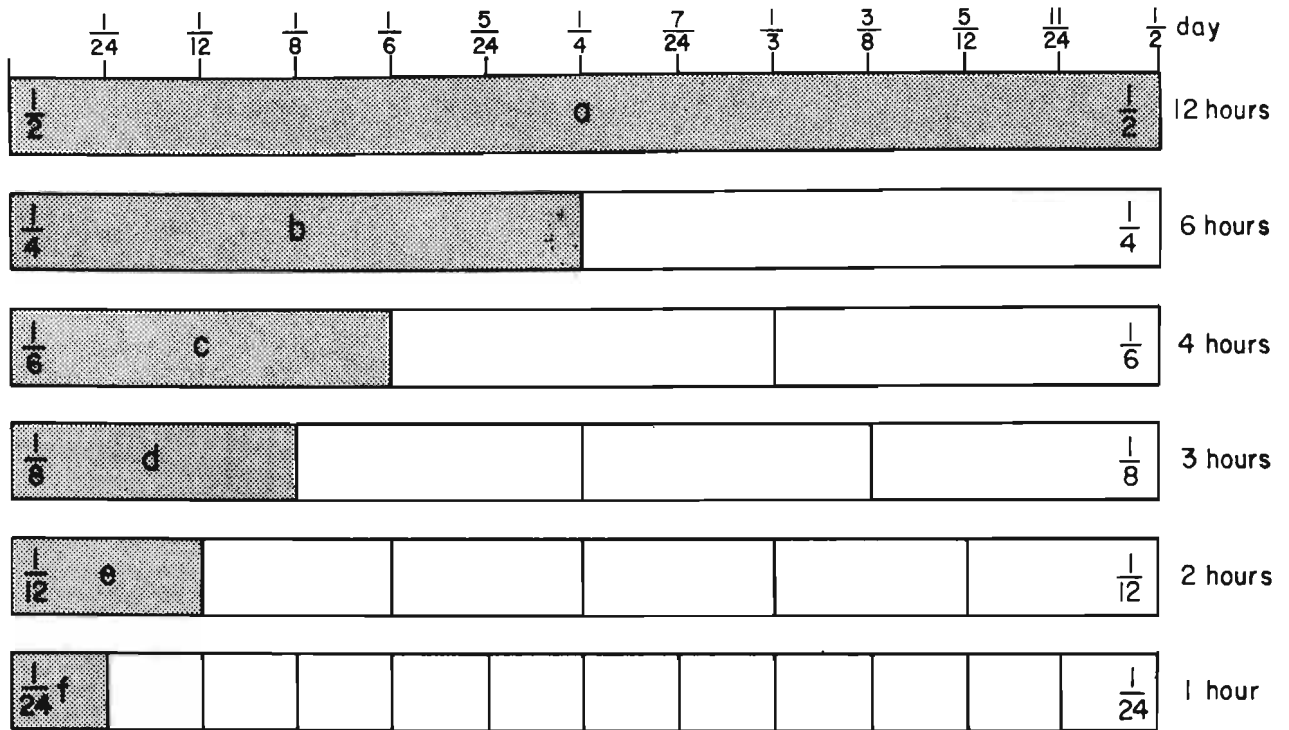
$\frac{1}{2} \times 100 = 50^A$	$2 \times 50 = 100$	$1 \times 100 = 100$
$\frac{1}{2} \times 400 = 200^B$	$2 \times 60 = 120$	$10 \times 100 = 1,000^D$
$\frac{1}{2} \times 4000 = 2,000^C$	$2 \times 500 = 1,000^D$	$100 \times 100 = 10,000$
$\frac{1}{2} \times 2000 = 1,000^D$	$2 \times 600 = 1,200$	$10 \times 1000 = 10,000$
$\frac{1}{2} \times 1000 = 500^E$	$8 \times 500 = 4,000$	$100 \times 1000 = 100,000$
$\frac{1}{2} \times 500 = 250^F$	$8 \times 600 = 4,800$	$1000 \times 1000 = 1,000,000$

Factor Trees (excluding 1 as a factor)



	A	B	C	D	E	F
G	50	8,9	2,2,3,5	6,6	2,6	250
H	2,2,11	7,7	2,000	6,9	4,8	2,7
I	9,9	2,3,13	7,9	1,000	5,6	6,7
J	2,2,2,3,3	200	2,2,5,5	8,8	500	4,9
K	5,9	5,5,5	7,8	5,8	6,8	2,8

What Can You See?



$$\frac{a - b}{\frac{1}{2} - \frac{1}{4}} = \frac{b}{\frac{1}{4}} \quad \text{A.}$$

$$\frac{b - d}{\frac{1}{4} - \frac{1}{8}} = \frac{d}{\frac{1}{8}} \quad \text{B.}$$

$$\frac{c - e}{\frac{1}{6} - \frac{1}{12}} = \frac{e}{\frac{1}{12}} \quad \text{C.}$$

$$\frac{e - f}{\frac{1}{12} - \frac{1}{24}} = \frac{f}{\frac{1}{24}} \quad \text{D.}$$

$$\frac{a - d}{\frac{1}{2} - \frac{1}{8}} = \frac{3d}{\frac{3}{8}} \quad \text{C.}$$

$$\frac{a - c}{\frac{1}{2} - \frac{1}{6}} = \frac{2c}{\frac{1}{3}} \quad \text{H.}$$

$$\frac{a \div 2}{\frac{1}{2} \div 2} = \frac{b}{\frac{1}{4}} \quad \text{H.}$$

$$\frac{a \times \frac{1}{2}}{\frac{1}{2} \times \frac{1}{2}} = \frac{b}{\frac{1}{4}} \quad \text{C.}$$

$$\frac{c \times \frac{1}{2}}{\frac{1}{6} \times \frac{1}{2}} = \frac{e}{\frac{1}{12}} \quad \text{G.}$$

$$\frac{a \times \frac{1}{3}}{\frac{1}{2} \times \frac{1}{3}} = \frac{c}{\frac{1}{6}} \quad \text{C.}$$

$$\frac{a \times \frac{2}{3}}{\frac{1}{2} \times \frac{2}{3}} = \frac{2c}{\frac{1}{3}} \quad \text{H.}$$

	A.	B.	C.	D.	E.	F.
G.	$\frac{3}{8}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{3}{7}$	$\frac{3}{4}$	$\frac{5}{24}$
H.	$\frac{1}{9}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{12}$	$\frac{1}{3}$	$\frac{5}{6}$
I.	$\frac{1}{4}$	$\frac{5}{12}$	$\frac{1}{24}$	$\frac{2}{3}$	$\frac{1}{24}$	$\frac{7}{12}$

$$\frac{b \times \frac{1}{6}}{\frac{1}{4} \times \frac{1}{6}} = \frac{f}{\frac{1}{24}} \quad \text{A.}$$

$$\frac{b \times \frac{5}{6}}{\frac{1}{4} \times \frac{5}{6}} = \frac{5f}{\frac{5}{24}} \quad \text{I.}$$

Two-Step and Four Step CHAIN REACTIONS

(note: * indicates several solutions)

$$81 \xrightarrow{\div 9} \xrightarrow{\times 4} 36 \quad \text{A.}$$

$$15 \xrightarrow{\times 3} \xrightarrow{\div 9} 5 \quad \text{B.}$$

$$12 \xrightarrow{\times 3} \xrightarrow{\div 6} 6 \quad \text{C.}$$

$$21 \xrightarrow{\times 2} \xrightarrow{\div 6} 7 \quad \text{C.}$$

$$6 \xrightarrow{\div 2} \xrightarrow{\times 3} 9 \quad \text{D. E.}^*$$

$$49 \xrightarrow{\div 7} \xrightarrow{\times 8} 56 \quad \text{A. B.}^*$$

$$72 \xrightarrow{\div 9} \xrightarrow{\times 4} 32 \quad \text{C.}$$

$$5 \xrightarrow{\div 5} \xrightarrow{\times 9} 9 \quad \text{B. C.}^*$$

$$35 \xrightarrow{\div 7} \xrightarrow{\times 10} 50 \quad \text{A. D.}$$

$$64 \xrightarrow{\times 3} \xrightarrow{\div 8} 24 \quad \text{E.}$$

$$42 \xrightarrow{\times 5} \xrightarrow{\div 7} 30 \quad \text{A.}$$

$$25 \xrightarrow{\times 6} \xrightarrow{\div 5} 30 \quad \text{B. C.}^*$$

$$16 \xrightarrow{\times 5} \xrightarrow{\div 2} 40 \quad \text{D. B.}^*$$

$$12 \xrightarrow{\times 3} \xrightarrow{\div 9} 4 \quad \text{C.}$$

$$15 \xrightarrow{\times 2} \xrightarrow{\div 6} 5 \quad \text{B.}$$

$$27 \xrightarrow{\times 10} \xrightarrow{\div 9} 30 \quad \text{C. D.}^*$$

$$4 \xrightarrow{\times 7} \xrightarrow{\div 4} 7 \quad \text{C. A.}^*$$

$$18 \xrightarrow{\div 2} \xrightarrow{\div 3} 3 \xrightarrow{\times 7} \xrightarrow{\times 2} 42 \quad \text{E. E.}$$

$$27 \xrightarrow{\div 9} \xrightarrow{\times 5} 15 \xrightarrow{\div 3} \xrightarrow{\times 5} 25 \quad \text{B. E. B.}^*$$

$$5 \xrightarrow{\times 9} \xrightarrow{\div 3} 15 \xrightarrow{\div 5} \xrightarrow{\times 7} 21 \quad \text{E. B. A.}^*$$

$$6 \xrightarrow{\div 2} \xrightarrow{\times 3} 9 \xrightarrow{\div 3} \xrightarrow{\times 5} 15 \quad \text{E. B.}^*$$

$$3 \xrightarrow{\div 3} \xrightarrow{\times 8} 8 \xrightarrow{\div 8} \xrightarrow{\times 7} 7 \quad \text{E. D. D. A.}^*$$

(If there is more than one solution, only the simplest is given.)

$$6 \xrightarrow{\div 3} \xrightarrow{\times 5} 10 \xrightarrow{\div 2} \xrightarrow{\times 7} 35 \quad \text{E. B. D. A.}^*$$

A.	B.	C.	D.	E.
7	11	4	2	42
30	5	6	8	24
36	8	9	10	3

+, -, × and ÷ Measurements

1 gross = 12 dozen


1 dollar = 2 half dollars

gr. doz. eggs

1 dozen = 12 eggs

1 half dollar = 2 quarters


\$100 \$10 \$1



$$\begin{array}{r} 001 \\ + 011 \\ \hline 100 \end{array}$$
 1 Q.
 3 Q.
 4 Q.

$$\begin{array}{r} 173 \\ + 068 \\ \hline 241 \end{array}$$
 231 e.
 80 e.
 311 e.


$$\begin{array}{r} 479 \\ + 479 \\ \hline 958 \end{array}$$
 \$ 479
 \$ 479
 \$ 958



$$\begin{array}{r} 100 \\ - 001 \\ \hline 099 \end{array}$$
 4 Q.
 1 Q.
 3 Q.

G. D. E.

$$\begin{array}{r} 144 \\ - 62 \\ \hline 82 \end{array}$$
 144 e.
 74 e.
 70 e.



$$\begin{array}{r} 804 \\ - 289 \\ \hline 515 \end{array}$$
 804¢
 289¢
 515¢

D. H. Q.

$$\begin{array}{r} 011 \\ \times 2 \\ \hline 110 \end{array}$$
 3 Q.
 x2
 6 Q.

G. D. E.

$$\begin{array}{r} 055 \\ \times 3 \\ \hline 143 \end{array}$$
 65 e.
 x3
 195 e.

M. dm. cm.

$$\begin{array}{r} 239 \\ \times 4 \\ \hline 956 \end{array}$$
 239 cm.
 x4
 956 cm.

D. H. Q.

$$\begin{array}{r} 110 \\ \div 3 \\ \hline 036 \end{array}$$
 6 Q.
 ÷3
 2 Q.

G. D. E.

$$\begin{array}{r} 310 \\ \div 2 \\ \hline 155 \end{array}$$
 454 e.
 ÷2
 227 e.

100's 10's 1's

$$\begin{array}{r} 144 \\ \div 6 \\ \hline 024 \end{array}$$
 144 (1's)
 ÷6
 24 (1's)

D. H. Q.

$$\begin{array}{r} 111 \\ + 011 \\ \hline 222 \end{array}$$
 7 Q.
 3 Q.
 10 Q.

G. D. E.

$$\begin{array}{r} 166 \\ + 166 \\ \hline 332 \end{array}$$
 222 e.
 222 e.
 444 e.

	A.	B.	C.	D.
E.	9,5,6	2,1,0	0,5,10	2,2,2
F.	3,1,0	2,1,11	1,6,11	5,1,5
G.	1,1,0	0,1,0	9,5,8	0,2,4
H.	1,0,0	1,4,3	3,4,5	0,1,1

Estimation

. . . or "coming close" . . . with easier arithmetic.

$38 \times 74 = 2812$

+2	-4	→	$40 \times 70 = 2800$	(-12) A.
+2	+1	→	$40 \times 75 = 3000$	(+188) B.
+4	-4	→	$42 \times 70 = 2940$	(+128) C.

(How close?)

Getting an exact result

$$\begin{array}{r} 38 \\ \times 74 \\ \hline 152 \\ 266 \\ \hline 2812 \end{array}$$

D.

$49 \times 83 = 4067$

+1	+1	→	$50 \times 84 = 4200$	(+133) A.
-1	-2	→	$48 \times 81 = 3888$	(-179)
+1	-3	→	$50 \times 80 = 4000$	(-67) C.

49
x 83
147
392
4067 D.

$275 \times 45 = 12,375$

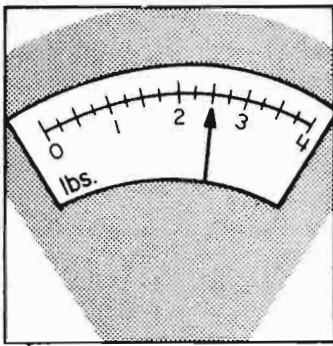
+25	+5	→	$300 \times 50 = 15,000$	(+2625) A.
-25	+5	→	$250 \times 50 = 12,500$	(+125) B.
+25	-5	→	$300 \times 40 = 12,000$	(-375) C.

275
x 45
1375
1100
12375 D.

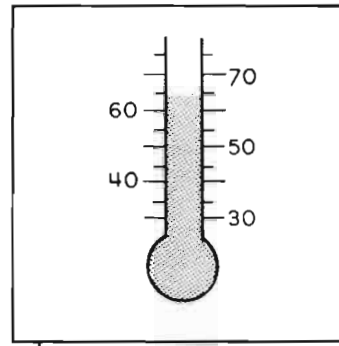
Taming frightfully big numbers . . .

$2 \times 75 = 150$ A.	$60,000 \div 2 = 30,000$ B.	$100 \times 100 = 10,000$ C.
$4 \times 75 = 300$	$60,000 \div 3 = 20,000$	$200 \times 500 = 100,000$ D.
$40 \times 75 = 3,000$	$60,000 \div 4 = 15,000$	
$4 \times 750 = 3,000$	$60,000 \div 5 = 12,000$	
$40 \times 750 = 30,000$	$60,000 \div 6 = 10,000$	
$20 \times 750 = 15,000$	$60,000 \div 10 = 6,000$	
$10 \times 750 = 7,500$	$60,000 \div 100 = 600$	

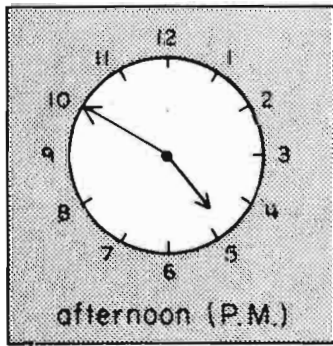
	A.	B.	C.	D.
E.	-12	+125	10,000	12,375
F.	150	+188	-375	2812
G.	+133	30,000	-67	100,000
H.	+2625	-17	+128	4067



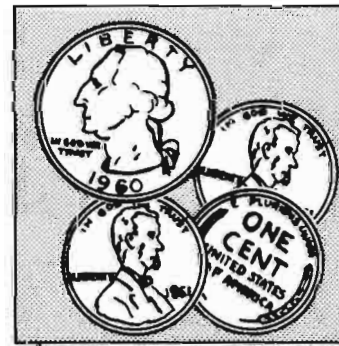
weight shown	<u>2 1/2</u> lb. A.
twice as much	<u>5</u> lb. B.
half as much	<u>1 1/4</u> lb. C.
3/4 lb. more	<u>3 1/4</u> lb. E.
3/4 lb. less	<u>1 3/4</u> lb. D.
three times as much	<u>7 1/2</u> lb. F.



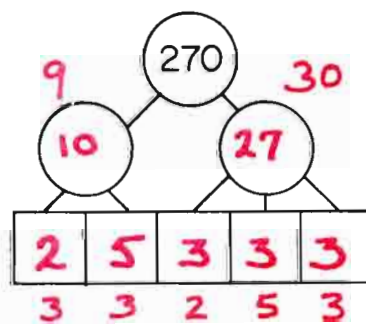
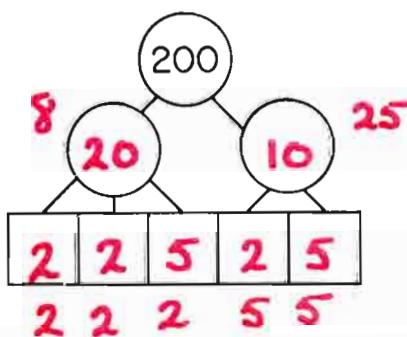
temperature shown	<u>65</u> ° A.
up 15°	<u>80</u> ° B.
down 25°	<u>40</u> ° C.
up 17°	<u>82</u> ° D.
down 65°	<u>0</u> ° E.
down 17°	<u>48</u> ° F.



time shown	<u>4 : 50</u> p.m. A.
6 hours earlier	<u>10 : 50</u> a.m. B.
1 1/4 hr. later	<u>6 : 05</u> p.m. A.
45 min. earlier	<u>4 : 05</u> p.m. B.
50 min. earlier	<u>4 : 00</u> p.m. B.
1/3 hour later	<u>5 : 10</u> p.m. A.
12 hours later	<u>4 : 50</u> a.m. A.
24 hours later	<u>4 : 50</u> p.m. A.



amount shown	<u>28</u> ¢ C.
half as much	<u>14</u> ¢ D.
twice as much	<u>56</u> ¢ E.
1/4 as much	<u>7</u> ¢ D.
3 times as much	<u>84</u> ¢ F.
49¢ more	<u>77</u> ¢ E.
19¢ less	<u>9</u> ¢ C.
1/2 dollar more	<u>78</u> ¢ F.



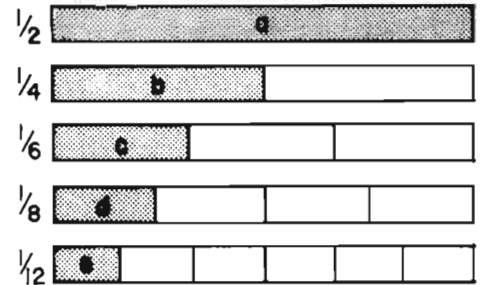
A.	B.	C.	D.	E.	F.
6:05	4:05	1 1/4	82	19	39
2 1/2	10:50	28	7	0	7 1/2
4:50	80	1	1 3/4	56	84
65	5	9	14	77	48
5:10	4:00	40	7	3 1/4	78

On Your Own (VII)

$$\begin{array}{r} 1000 \\ - 392 \\ \hline 608 \end{array}$$

$$\begin{array}{r} 12 \quad 21 \\ 148,296 \\ 148,296 \\ + 148,296 \\ \hline 444,888 \end{array}$$

$$\begin{array}{r} 296 \\ \times 75 \\ \hline 1480 \\ 2072 \\ \hline 22200 \end{array}$$



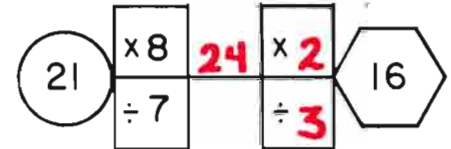
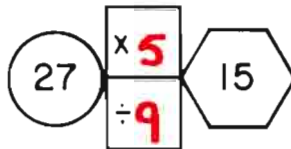
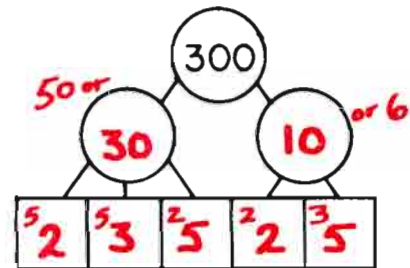
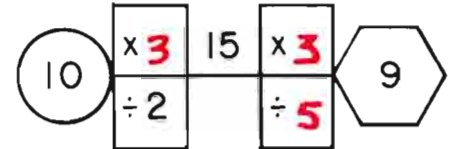
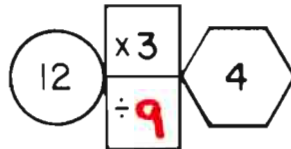
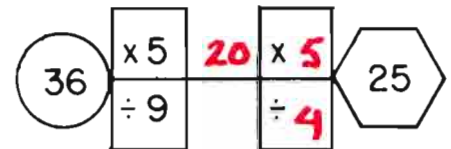
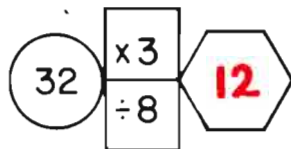
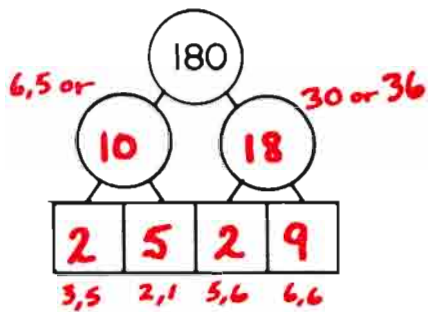
Please circle the letter after the line you think will be the best "estimate".

64×66	A. 4,224	349×25	D. 8,725
60×60	B. 3,600	350×30	E. 10,500
70×70	C. 4,900	300×20	F. 6,000
70×60	4,200	400×20	8,000

$$\frac{b - c}{\frac{1}{4} - \frac{1}{6}} = \frac{e}{\frac{1}{12}}$$

$$\frac{a - 2d}{\frac{1}{2} - \frac{1}{4}} = \frac{b}{\frac{1}{4}}$$

$$\frac{b \times \frac{1}{2}}{\frac{1}{4} \times \frac{1}{2}} = \frac{d}{\frac{1}{8}}$$



1 gross = 12 doz.

1 dozen = 12 eggs

gr.	doz.	eggs	
1	7	9	237 e.
+	3	8	530 e.
	4	15	767 e.
	5	3	



How do you feel?

g.	d.	e.	
7	10	0	1128 e.
		÷ 3	376 e.
	2	7	
	4		

If the results aren't interesting
 then one of us goofed! signed "GOOOOOFY"

$\begin{array}{r} 79 \\ + 32 \\ \hline 111 \end{array}$	$\begin{array}{r} 63 \\ + 42 \\ \hline 105 \end{array}$ B.	$\begin{array}{r} 37 \\ \times 3 \\ \hline 111 \end{array}$	$\begin{array}{r} 4 \\ \times 3 \\ \hline 12 \end{array}$	$\begin{array}{r} 401 \\ - 179 \\ \hline 222 \end{array}$ D.	$\begin{array}{r} 74 \\ \times 3 \\ \hline 222 \end{array}$ H.
---	---	---	---	---	---

$\begin{array}{r} 123 \\ 4 \overline{)492} \end{array}$ C.	$\begin{array}{r} 37 \\ \times 9 \\ \hline 333 \end{array}$ A.	$\begin{array}{r} 76 \\ + 9 \\ \hline 85 \end{array}$ B.	$\begin{array}{r} 7 \\ \times 8 \\ \hline 56 \end{array}$ D.	$\begin{array}{r} 143 \\ \times 7 \\ \hline 1001 \end{array}$ A.	$\begin{array}{r} 13 \\ 4 \overline{)52} \end{array}$ B.
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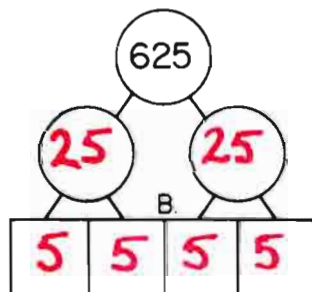
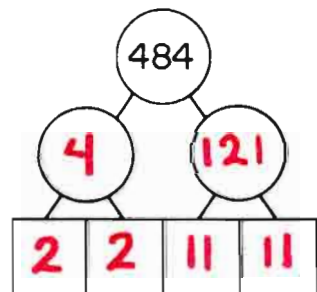
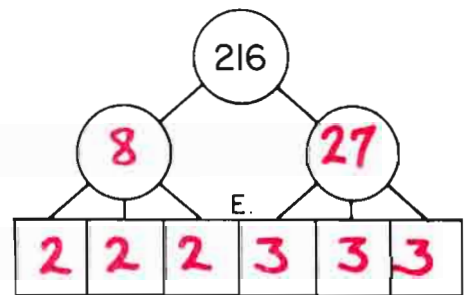
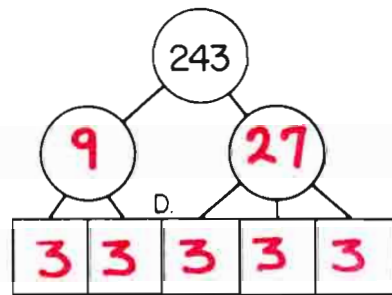
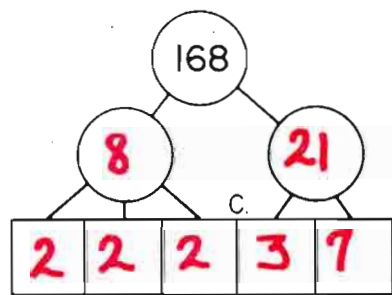
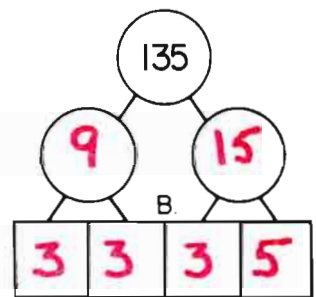
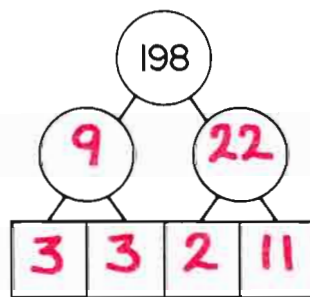
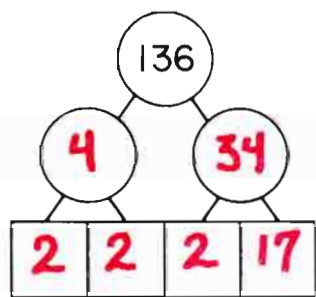
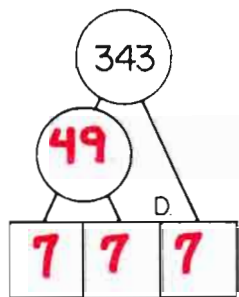
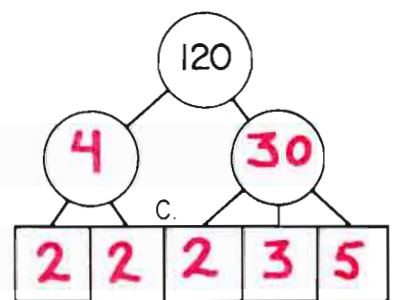
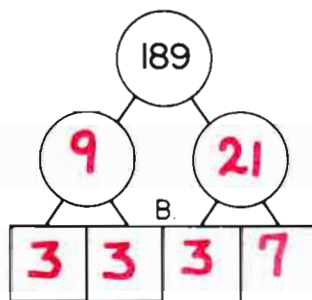
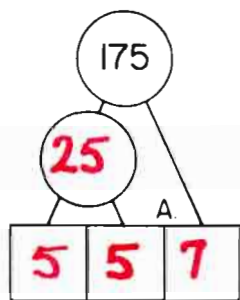
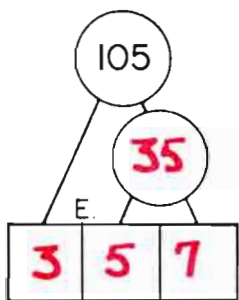
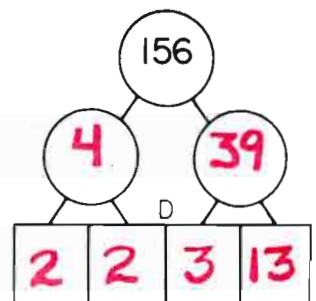
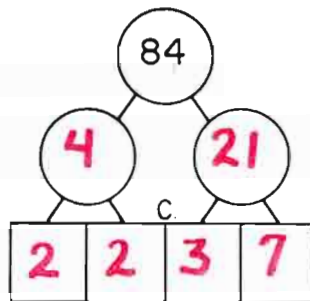
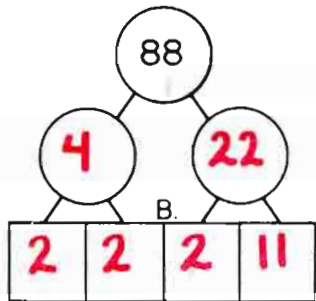
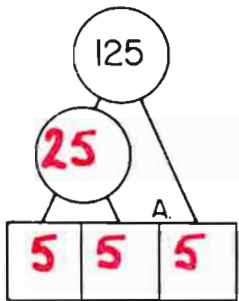
$\begin{array}{r} 185 \\ \times 6 \\ \hline 1110 \end{array}$ A.	$\begin{array}{r} 4321 \\ - 3087 \\ \hline 1234 \end{array}$ B.	$\begin{array}{r} 57 \\ 6 \overline{)342} \end{array}$ C.	$\begin{array}{r} 74 \\ \times 9 \\ \hline 666 \end{array}$ D.	$\begin{array}{r} 1738 \\ \times 4 \\ \hline 6952 \end{array}$ A.
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Peculiar Pairs

$\begin{array}{r} 42 \\ \times 12 \\ \hline 84 \\ 42 \\ \hline 504 \end{array}$ B.	$\begin{array}{r} 39 \\ \times 31 \\ \hline 39 \\ 117 \\ \hline 1209 \end{array}$ C.	$\begin{array}{r} 42 \\ \times 36 \\ \hline 252 \\ 126 \\ \hline 1512 \end{array}$ D.	$\begin{array}{r} 918 \\ - 275 \\ \hline 643 \end{array}$ C.	$\begin{array}{r} 504 \\ - 178 \\ \hline 326 \end{array}$ D.
$\begin{array}{r} 24 \\ \times 21 \\ \hline 24 \\ 48 \\ \hline 504 \end{array}$ G.	$\begin{array}{r} 93 \\ \times 13 \\ \hline 279 \\ 93 \\ \hline 1209 \end{array}$ F.	$\begin{array}{r} 24 \\ \times 63 \\ \hline 72 \\ 144 \\ \hline 1512 \end{array}$ E.	$\begin{array}{r} 1026 \\ - 437 \\ \hline 589 \end{array}$ A.	$\begin{array}{r} 1503 \\ - 624 \\ \hline 879 \end{array}$ C.

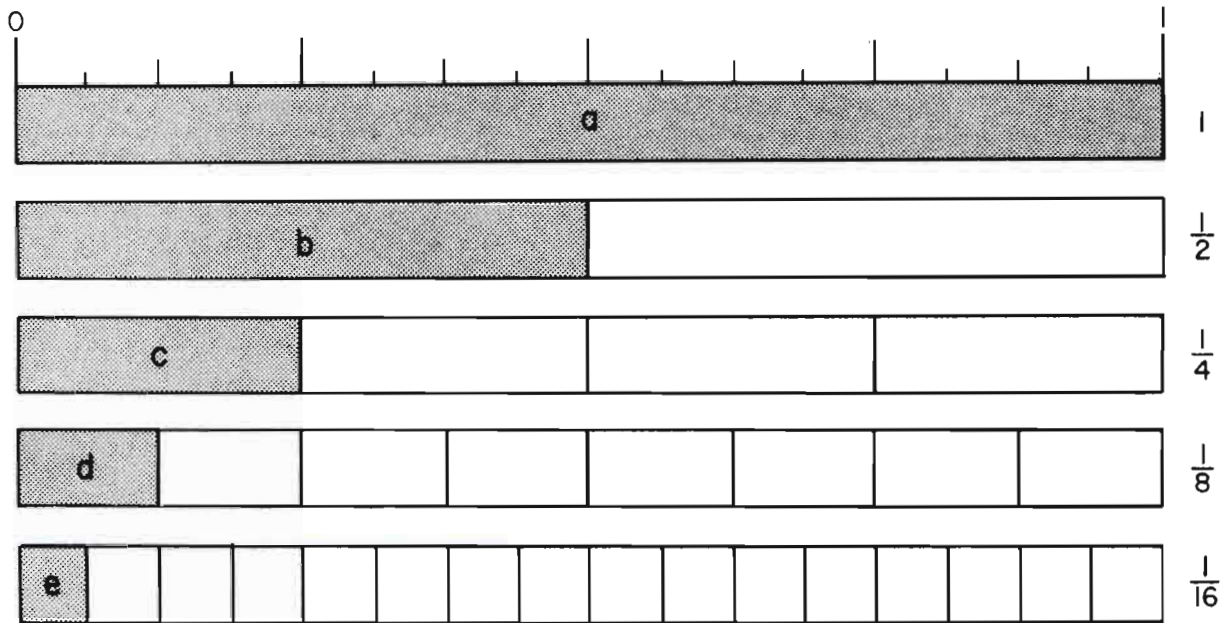
	A.	B.	C.	D.
E.	6952	13	643	1512
F.	589	105	1209	56
G.	333	504	57	326
H.	1001	1234	123	222
I.	1110	85	879	666

Factor Trees (excluding 1 as a factor) . . . You will need scratch paper.



A.	B.	C.	D.	E.
5,5,7	5,5,5,5	2,2 2,3,7	2,2,3,13	7,11,13
2,2 11,11	3,3,3,5	2,2 2,3,5	5,5 5,5,5	3,5,7
5,5,5	3,3,3,7	2,2,3,7	3,3 3,3,3	2,2,5,7
2,3,3,11	2,2,2,11	7,7,7,7	7,7,7	2,2,2 3,3,3

What Can You See?



$$\frac{1/2 \times b}{1/2 \times 1/2 \text{ A.}} = \frac{c}{1/4 \text{ B.}}$$

$$\frac{1/2 \times c}{1/2 \times 1/4 \text{ B.}} = \frac{d}{1/8 \text{ C.}}$$

$$\frac{1/2 \times d}{1/2 \times 1/8 \text{ C.}} = \frac{e}{1/16 \text{ D.}}$$

$$\frac{1/4 \times c}{1/4 \times 1/4 \text{ I.}} = \frac{e}{1/16 \text{ H.}}$$

$$\frac{1/4 \times b}{1/4 \times 1/2 \text{ H.}} = \frac{d}{1/8 \text{ G.}}$$

$$\frac{1/8 \times b}{1/8 \times 1/2 \text{ A.}} = \frac{e}{1/16 \text{ D.}}$$

$$\frac{1/2 \times 3c}{1/2 \times 3/4 \text{ B.}} = \frac{3d}{3/8 \text{ A.}}$$

$$\frac{1/2 \times 3d}{1/2 \times 3/8 \text{ A.}} = \frac{3e}{3/16 \text{ C.}}$$

$$\frac{1/2 \times 5d}{1/2 \times 5/8 \text{ D.}} = \frac{5e}{5/16 \text{ G.}}$$

$$\frac{3/4 \times b}{3/4 \times 1/2 \text{ A.}} = \frac{3d}{3/8 \text{ I.}}$$

$$\frac{3/8 \times b}{3/8 \times 1/2 \text{ H.}} = \frac{3e}{3/16 \text{ C.}}$$

$$\frac{5/8 \times b}{5/8 \times 1/2 \text{ H.}} = \frac{5e}{5/16 \text{ E.}}$$

$$\frac{3/4 \times c}{3/4 \times 1/4 \text{ B.}} = \frac{3e}{3/16 \text{ C.}}$$

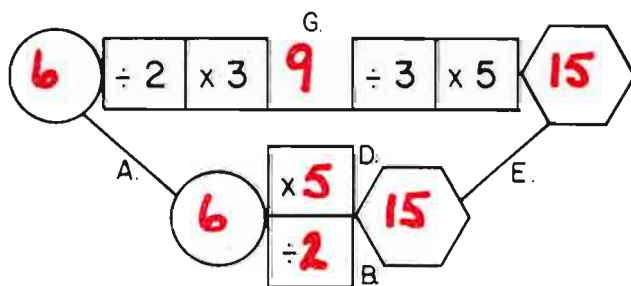
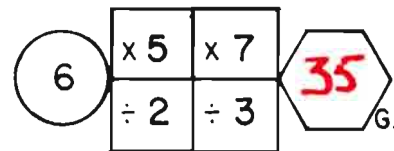
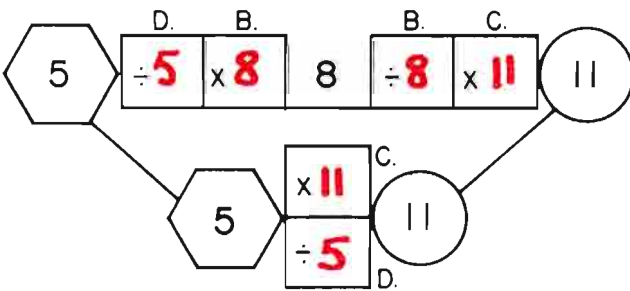
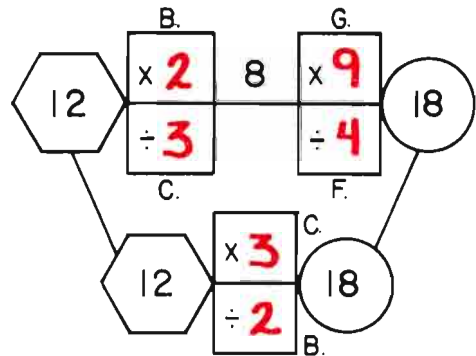
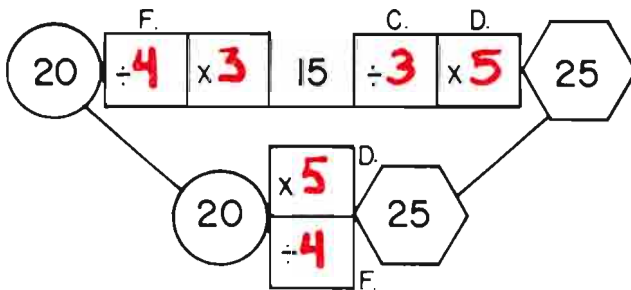
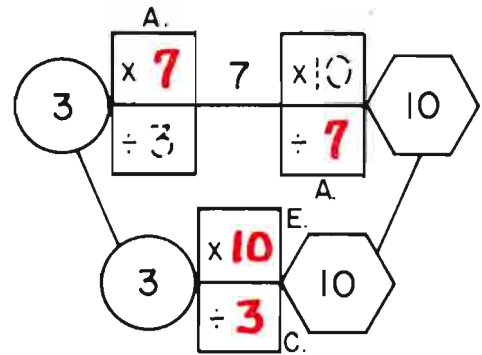
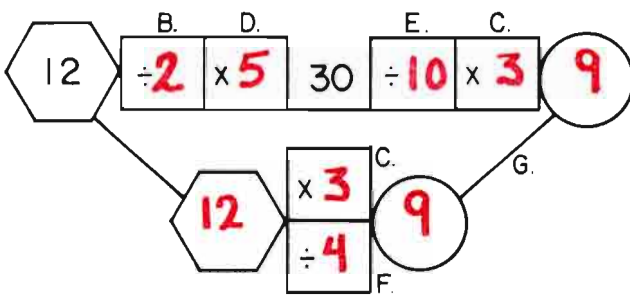
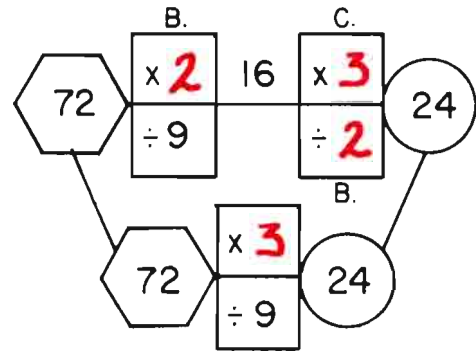
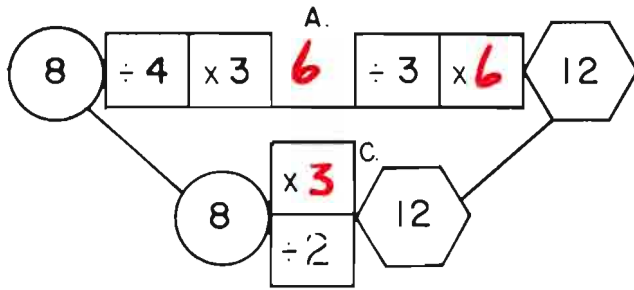
$$\frac{1/2 \times 7d}{1/2 \times 7/8 \text{ E.}} = \frac{7e}{7/16 \text{ F.}}$$

$$\frac{1/4 \times 3c}{1/4 \times 3/4 \text{ B.}} = \frac{3e}{3/16 \text{ C.}}$$

$$\frac{3/4 \times 3c}{3/4 \times 3/4 \text{ B.}} = \frac{9e}{9/16 \text{ F.}}$$

	A.	B.	C.	D.	E.	F.
G.	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{1}{8}$	$\frac{5}{8}$	$\frac{5}{16}$	$\frac{11}{13}$
H.	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{16}$	$\frac{1}{16}$	$\frac{13}{16}$	$\frac{7}{16}$
I.	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{15}{16}$	$\frac{7}{10}$	$\frac{7}{8}$	$\frac{9}{16}$

Chain Reactions . . . and Shortcuts



A.	B.	C.	D.	E.	F.	G.
6	12	11	14	10	16	15
1	2	13	5	17	4	35
7	8	3	18	15	20	9

+, -, × and ÷ Measurements

1 quarter = 5 nickels

1 hr. = 60 min.

1 dime = 2 nickels

1 min. = 60 sec.

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	A.	B.	C.	D.
E.	8,7,6	0,2,0	2,4,30	2,1,0
F.	8,9,4	3,1,0	3,31,30	5,5,6
G.	3,1,1	5,4,3	12,8,7	0,4,9
H.	3,0,1	1,11,10	0,7,30	1,1,0

Estimation

... or "coming close" ... with easier arithmetic.

$$\underline{2279 \div 53 = 43}$$

$$\begin{array}{|c|c|} \hline -279 & -3 \\ \hline \end{array} \longrightarrow$$

$$\underline{2000 \div 50 = 40} \quad (-3) \text{ E.}$$

$$\begin{array}{|c|c|} \hline -79 & -3 \\ \hline \end{array} \longrightarrow$$

$$\underline{2200 \div 50 = 44} \quad (+1) \text{ F.}$$

$$\begin{array}{|c|c|} \hline +21 & -3 \\ \hline \end{array} \longrightarrow$$

$$\underline{2300 \div 50 = 46} \quad (+3) \text{ G.}$$

(How close?)

Getting an exact result

$$\begin{array}{r} 43 \\ 53 \overline{)2279} \\ \underline{212} \\ 159 \\ \underline{159} \\ 0 \end{array}$$

$$\underline{5005 \div 35 = 143}$$

$$\begin{array}{|c|c|} \hline -1005 & +5 \\ \hline \end{array} \longrightarrow$$

$$\underline{4000 \div 40 = 100} \quad (-43) \text{ E.}$$

$$\begin{array}{|c|c|} \hline +995 & -5 \\ \hline \end{array} \longrightarrow$$

$$\underline{6000 \div 30 = 200} \quad (+57) \text{ F.}$$

$$\begin{array}{|c|c|} \hline -505 & -5 \\ \hline \end{array} \longrightarrow$$

$$\underline{4500 \div 30 = 150} \quad (+7) \text{ G.}$$

$$\begin{array}{r} 143 \\ 35 \overline{)5005} \\ \underline{35} \\ 150 \\ \underline{140} \\ 105 \\ \underline{105} \\ 0 \end{array}$$

$$\underline{9,265 \div 85 = 109}$$

$$\begin{array}{|c|c|} \hline +735 & +15 \\ \hline \end{array} \longrightarrow$$

$$\underline{10,000 \div 100 = 100} \quad (-9) \text{ D.}$$

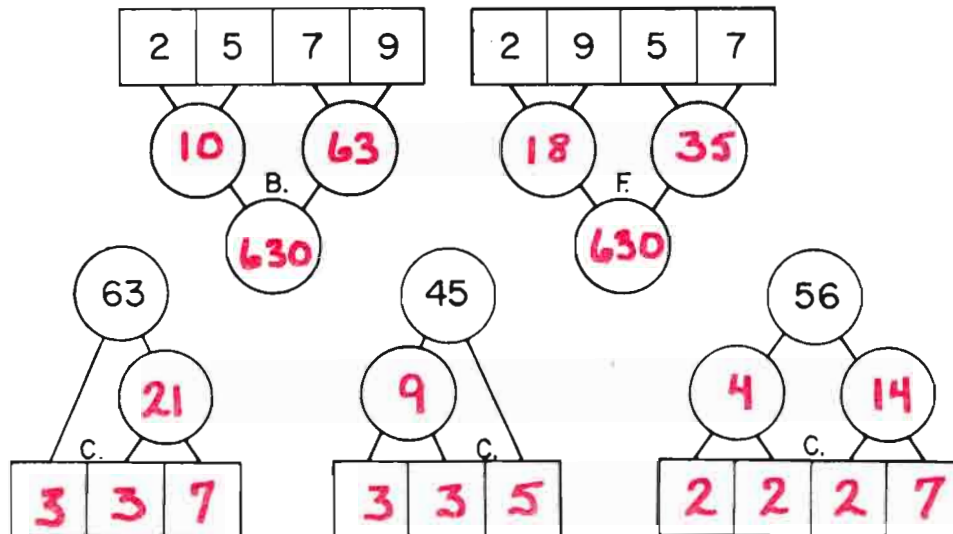
$$\begin{array}{|c|c|} \hline +635 & +5 \\ \hline \end{array} \longrightarrow$$

$$\underline{9,900 \div 90 = 110} \quad (+1) \text{ F.}$$

$$\begin{array}{|c|c|} \hline -265 & +5 \\ \hline \end{array} \longrightarrow$$

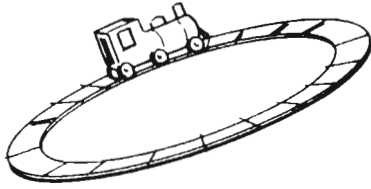
$$\underline{9,000 \div 90 = 100} \quad (-9) \text{ E.}$$

$$\begin{array}{r} 109 \\ 85 \overline{)9,265} \\ \underline{85} \\ 76 \\ \underline{76} \\ 0 \\ \underline{765} \\ 0 \end{array}$$



Factor Trees (excluding 1 as a factor)

	A.	B.	C.	D.
E.	-43	-3	3,3,7	-9
F.	+57	630	2,3,5,11	+1
G.	+18	+3	3,3,5	+7
H.	-19	+14	2,2,2,7	-17



Lou found it took his model train 5 seconds to go around a circular track. He measured the track as 8 feet around. He wondered how many miles per hour the train was going.

Lou made a table like this: (Please fill in the missing entries.)

time	5 sec.	10 sec.	15 sec.	20 sec.	40 sec.	60 sec.
distance	8 ft.	16 ft.	24 ft.	32 ft.	64 ft.	96 ft.

60 seconds = 1 minute

time	1 min.	2 min.	20 min.	40 min.	60 min.
distance	96 ft.	192 ft.	1920 ft.	3840 ft.	5760 ft.

There are 5,280 feet in one mile. How do you think Lou answers his question: How many miles per hour was his train travelling? "about 1+ m.p.h." or 1.1 m.p.h.

Please make up your own problem of a similar kind.



Marie found she rode 10 ft. on her bicycle in 1 second. About how many miles per hour was she riding.

The blanks below may help you solve your problem.

time	1 sec.	60 sec.	1 min.	60 min.	1 hr.
distance	10 ft.	600	600	36,000 ft.	36,000 ft.

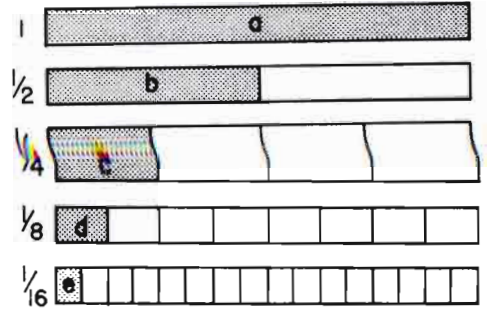
time	ABOUT	PER HOUR			
distance		7 miles	or 6.81 m.p.h.		

On Your Own (VIII)

$$\begin{array}{r} 1738 \\ \times 4 \\ \hline 6952 \end{array}$$

$$\begin{array}{r} 1305 \\ - 879 \\ \hline 426 \end{array}$$

$$\begin{array}{r} 146 \\ 35 \overline{) 5110} \\ \underline{761} \\ 140 \\ \underline{210} \\ 210 \end{array}$$

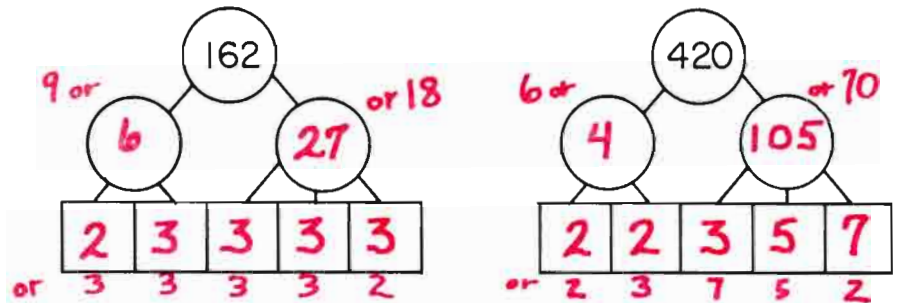
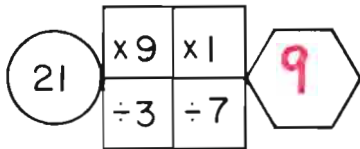
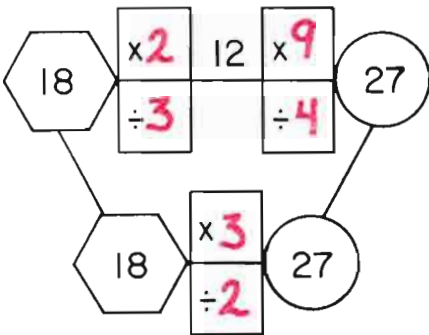


Please circle the letter after the line you think will be the best "estimate".

$$\begin{array}{l} \boxed{4500 \div 66} = 68.18 \\ 4200 \div 70 \text{ A.} = 60 \\ 4200 \div 60 \text{ B.} = 70 \\ 4800 \div 60 \text{ C.} = 80 \end{array}$$

$$\begin{array}{l} \boxed{8513 \div 125} = 68.10 \\ 8500 \div 100 \text{ D.} = 85 \\ 9000 \div 100 \text{ E.} = 90 \\ 8000 \div 100 \text{ F.} = 80 \end{array}$$

$$\begin{array}{l} \frac{1}{4} \times b = d \\ \frac{1}{4} \times \frac{1}{2} = \frac{1}{8} \\ \frac{3}{4} \times c = 3e \\ \frac{3}{4} \times \frac{1}{4} = \frac{3}{16} \\ \frac{1}{2} \times 5d = 5e \\ \frac{1}{2} \times \frac{5}{8} = \frac{5}{16} \end{array}$$



	100 %	10 %	5 %	110 %	205 %
\$ 10.00	\$ 1.00	\$.50	\$ 11.00	\$ 20.50	
\$ 5.00	\$.50	\$.25	\$ 5.50	\$ 10.25	
\$ 15.00	\$ 1.50	\$.75	\$ 16.50	\$ 30.75	

1 hour = 60 minutes

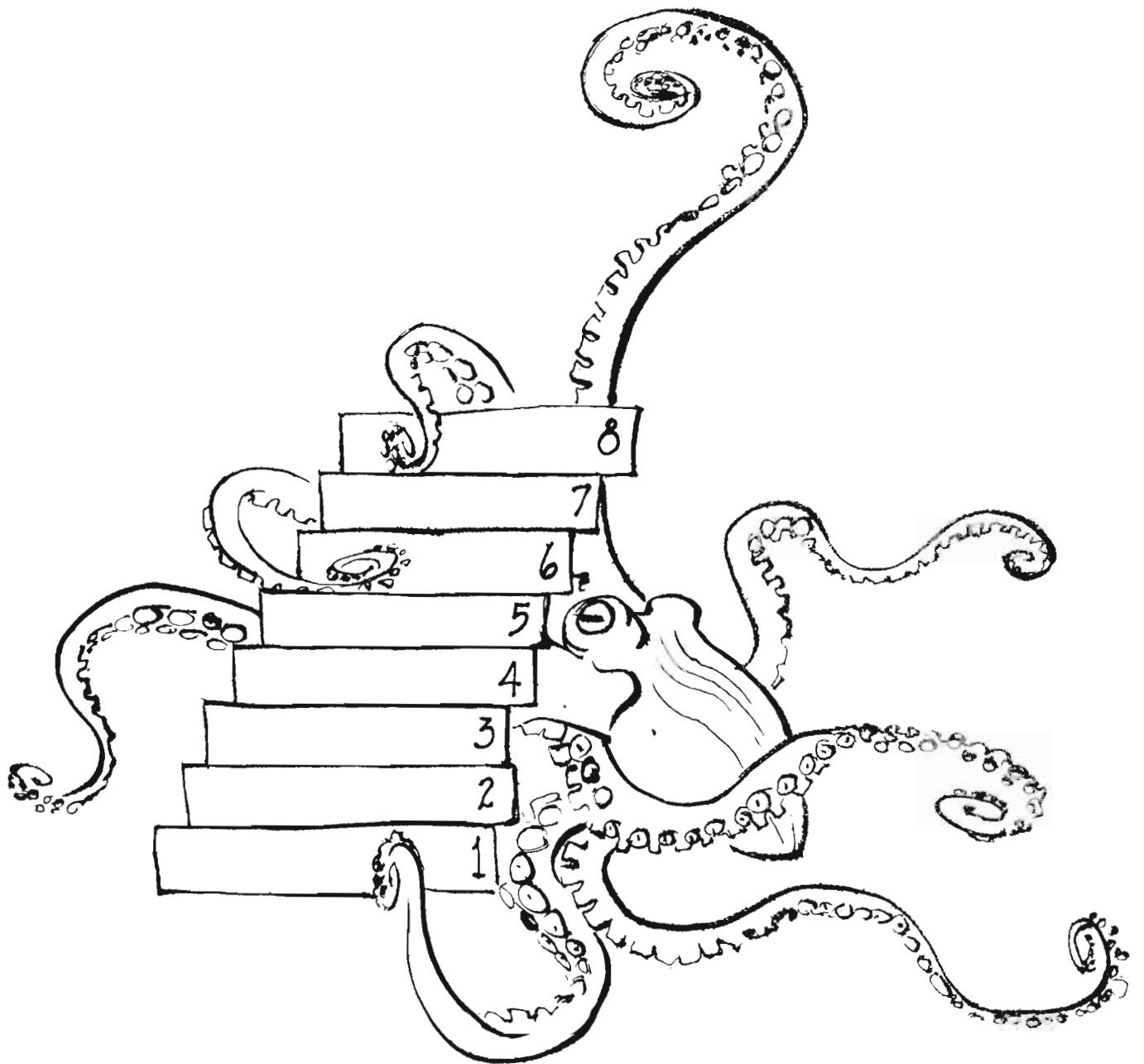
$$\begin{array}{r|l} \text{h.} & \text{m.} & \text{s.} \\ \hline 1 & 30 & 45 \\ + 1 & 30 & 15 \\ \hline 3 & 1 & 0 \\ \text{or } 2 & 60 & 60 \end{array} \quad \begin{array}{l} 585 \\ 555 \\ 1140 \end{array}$$

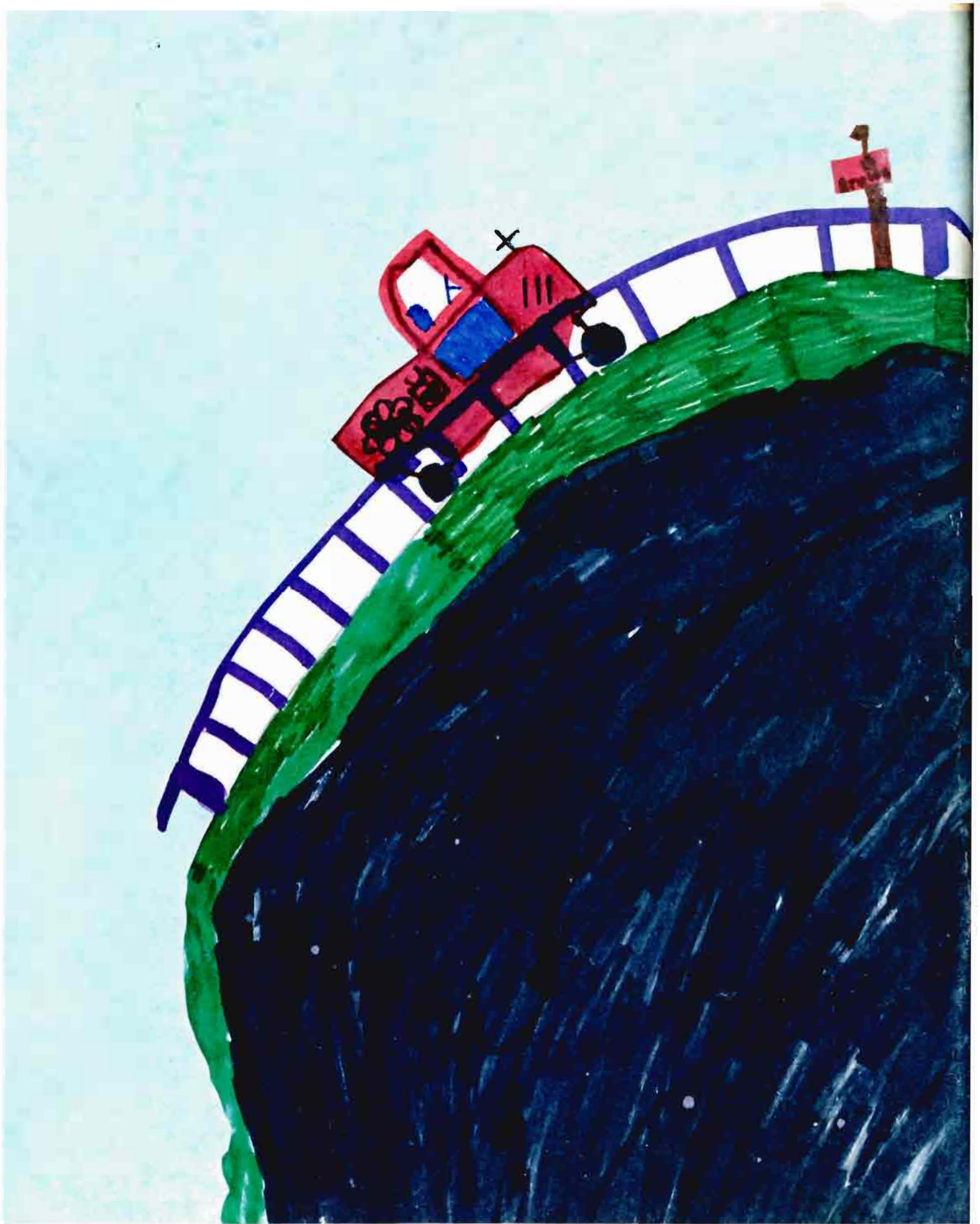
1 minute = 60 seconds

$$\begin{array}{r|l} \text{h.} & \text{m.} & \text{s.} \\ \hline 1 & 0 & 0 \\ - 9 & 48 & \\ \hline 50 & 12 & \end{array} \quad \begin{array}{l} 3600 \\ 588 \\ 3012 \end{array}$$



How do you feel?





*his book
belongs to* _____

*este libro
es de* _____