

DOUBLE CROSS

1. What do you get when you cross an absent-minded elephant with a small flea?

Answer:

$$\frac{1}{2} \quad -4 \quad \frac{9}{4} \quad -\frac{17}{15} \quad \frac{30}{7} \quad -2 \quad 1 \quad 23 \quad -2 \quad \frac{30}{7} \quad 5 \quad \frac{1}{2} \quad 1$$

2. What do you get when you cross a shark with a snowball?

Answer:

$$-4 \quad -\frac{17}{15} \quad \frac{9}{4} \quad \frac{11}{2} \quad 1 \quad -\frac{5}{4} \quad 20 \quad 1 \quad -2$$

Solve each equation below and find the solution in the code. Each time the solution appears, write the letter of that exercise above it.

Ⓒ $\frac{x}{2} + \frac{2x}{3} = 5$

Ⓘ $\frac{9x}{5} - \frac{3x}{2} = 6$

ⓐ $\frac{2n-3}{2} = \frac{3}{4}$

Ⓢ $\frac{1}{3}(a+5) = \frac{7}{2}$

Ⓐ $\frac{3x-1}{4} + \frac{x}{2} = \frac{3}{8}$

Ⓔ $\frac{2t+2}{3} - \frac{5t}{4} = \frac{11}{6}$

Ⓜ $\frac{1}{5}(2x-1) = \frac{1}{3}(x+4)$

Ⓑ $\frac{3k-8}{14} + \frac{5}{7} = \frac{k+1}{2}$

Ⓡ $\frac{x+3}{4} - 2 = \frac{5x-2}{5}$

Ⓝ $\frac{4x}{3} - \frac{2x+3}{6} = \frac{9}{2}$

Ⓕ $\frac{1}{10}(m+8) - \frac{1}{15}(m-5) = 1$

Ⓣ $\frac{5x}{6} - \frac{3-x}{8} = \frac{4x+3}{12}$



What Did the Girl Rock Say to the Boy Rock?

Solve each problem below. Find your answer in the answer column and notice the two letters next to it. Write these letters in the two boxes that contain the number of that exercise.

<p>① One half of a number added to two thirds of the number is 21. Find the number. _____</p>	NO 48, 50
<p>② Three fifths of a number plus one fourth of the number is 34. Find the number. _____</p>	AL 8, 9
<p>③ One third of a number is 15 less than five sixths of the number. Find the number. _____</p>	IT 18
<p>④ Two thirds of a number is $3\frac{1}{2}$ more than three eighths of the number. Find the number. _____</p>	ST 120
<p>⑤ One half of a certain even integer plus one fifth of the next consecutive even integer equals 48. Find the two integers. _____, _____</p>	BE 12
<p>⑥ A class has 1 more boy than girl. One third of the boys and three fourths of the girls love pizza. If 9 students love pizza, how many girls and how many boys are in the class? _____, _____</p>	LD 100
<p>⑦ Will is twice as old as Jill. Three years ago, Jill's age was two fifths of Will's age then. How old is each now? _____, _____</p>	ER 40
<p>⑧ Zarina spent one fourth of her money on food, three tenths of her money on books, and two fifths of her money on records. If she spent \$95 on these three items all together, how much money did she have to begin with? \$ _____</p>	ES 10, 20
	TL 68, 70
	EN 60
	OU 30
	EB 9, 18
	DO 15
	AF 14, 15



4	4	6	6	1	1	5	5	7	7	3	3	8	8	2	2
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Did You Hear About...



A	B	C	D	E	F
G	H	I	J	K	L
					?

11 WANTED	Solve each equation below. Find your answer in one of the answer columns and notice the word next to it. Write this word in the box above that contains the letter of that exercise. Keep working and you will hear about a college "eye deal."	$\frac{7}{2}$ PROFESSOR
-8 HAD		$\frac{3}{4}$ EYED
-6 STUDENTS		$-\frac{2}{9}$ SUBJECTS
3 THE		1 OVER
$-\frac{11}{3}$ CONTROL		7 NO
$\frac{1}{8}$ REASON		$\frac{9}{5}$ A
10 CROSS		$-\frac{1}{2}$ WHO
$\frac{8}{3}$ HIS		-2 PUPILS
-4 COLLEGE		$\frac{5}{12}$ THAT

Solve each equation below. Find your answer in one of the answer columns and notice the word next to it. Write this word in the box above that contains the letter of that exercise. Keep working and you will hear about a college "eye deal."

(A) $\frac{1}{9} + \frac{1}{x} = \frac{4}{9}$

(B) $\frac{2}{5} + \frac{1}{x} = \frac{2}{5}$

(C) $\frac{5}{4x} + \frac{1}{x} = 3$

(D) $\frac{7}{n-3} = \frac{4}{n}$

(E) $\frac{8}{5x} - \frac{2}{3x} = \frac{4}{15}$

(F) $\frac{a+5}{4a} + \frac{11}{12} = \frac{2}{3a}$

(G) $\frac{x}{2x+6} - \frac{1}{x+3} = 1$

(H) $\frac{1}{m+5} = \frac{2}{m^2-25}$

(I) $\frac{1}{y+3} = \frac{7}{y-3} - \frac{2}{y^2-9}$

(J) $\frac{x-3}{2x-4} = \frac{x}{x-2} + 2$

(K) $\frac{x+5}{x^2-x} - \frac{3}{x} = \frac{1}{x-1}$

(L) $\frac{n+3}{n} - \frac{n+2}{n+5} = \frac{1}{n}$

What Sound Did the Sheep Hear When Her Sister Exploded?



Solve each equation and find your answer in the rectangle below. Cross out the box that contains your answer. When you finish, write the letters from the remaining boxes in the spaces at the bottom of the page.

$$\textcircled{1} \quad \frac{2}{x+3} + \frac{3}{x+4} = \frac{7}{x^2 + 7x + 12}$$

$$\textcircled{2} \quad \frac{4}{x-5} + \frac{1}{x+2} = \frac{2x+7}{x^2 - 3x - 10}$$

$$\textcircled{3} \quad \frac{a-30}{a^2 + 4a - 21} = \frac{5}{a+7} - \frac{2}{a-3}$$

$$\textcircled{4} \quad \frac{x}{x+4} = \frac{3}{x-1}$$

$$\textcircled{5} \quad \frac{6}{y+2} + \frac{1}{y-2} = 1$$

$$\textcircled{6} \quad \frac{3}{n} + \frac{2}{n-1} = 2$$

$$\textcircled{7} \quad 2 = \frac{x}{x+3} - \frac{3}{x-5}$$

$$\textcircled{8} \quad \frac{1}{d-7} + \frac{d}{d-2} = \frac{5}{d^2 - 9d + 14}$$

$$\textcircled{9} \quad \frac{x-1}{x+1} - \frac{6}{x-3} = 3$$

YE	SI	CK	SB	AM	SH	OO	FR	KO	MB	IG	UP	AH	ER
6, 1	-5, 2	-1	-9	-3, 1	$-\frac{1}{2}$	2, 8	-7, 3	-2	$\frac{1}{4}, -1$	$\frac{1}{2}, 3$	$\frac{4}{3}$	$\frac{1}{3}, 5$	6, -2

What Is the Title of This Picture?

CODED TITLE:

18 11 32 11 200 45 60 11.34 11 18

5 25.2 200 45 54.12 200 25.2 24 24 60 11.34 30

7 200 7 85 25.2 200 70 6.4 7 18 11

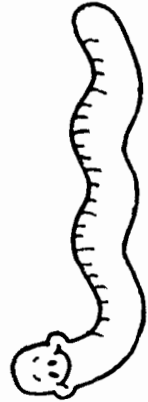
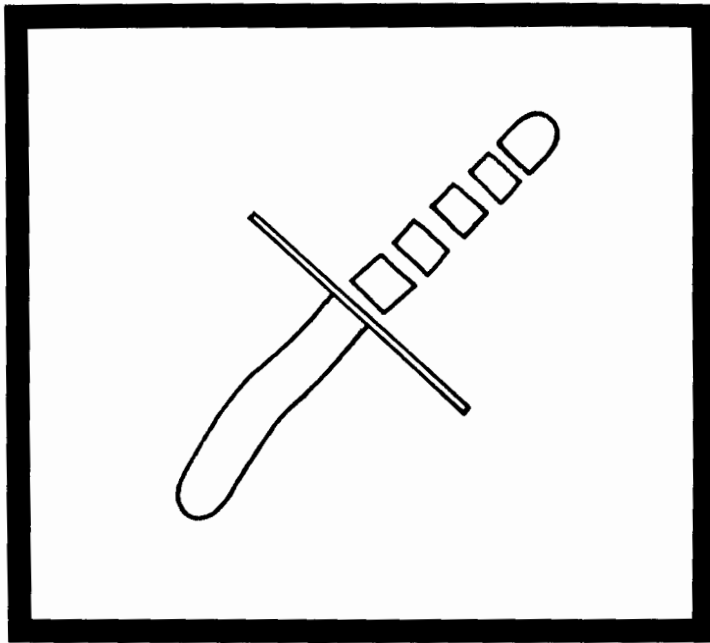
TO DECODE THE TITLE OF THIS PICTURE:

Find what number should go in the blank in each exercise below. Each time this number appears in the code, write the letter of that exercise above it.

- (N) 21% of 54 = _____
 (O) 7% of 360 = _____
 (G) 40% of 75 = _____
 (I) _____ % of 40 = 24
 (T) _____ % of 25 = 8
 (A) _____ % of 500 = 35

- (C) 66% of 82 = _____
 (E) _____ = 4% of 275
 (L) _____ = 80% of 8
 (W) _____ % of 90 = 4.5
 (Z) 10.2 = _____ % of 12
 (S) 14.4 out of 60 = _____ %

- (B) 30% of _____ = 21
 (M) 8% of _____ = 3.6
 (D) 75% of _____ = 13.5
 (R) 3% of _____ = 6



DAFFYNYTION DECODER

1. Sleeping Bag:

____ _
 225 $33\frac{1}{3}$ 31.2 7000 $33\frac{1}{3}$ 15 45

2. Twins:

____ _
 90 1.25 140 $26\frac{2}{3}$ 140 $33\frac{1}{3}$ 224 3.5 7000

3. Buckshot:

____ _
 $33\frac{1}{3}$ 200 1.25 19.6 19.6 $33\frac{1}{3}$ 32 90 $33\frac{1}{3}$ 7000 224 3.5 200

TO DECODE THESE THREE DAFFYNYTIONS:

Find what number should go in the blank in each exercise below. Each time this answer appears in the code, write the letter of the exercise above it. Keep working and you will decode "define" print.

(T) 70% of 320 = _____

(P) 130% of 24 = _____

(O) 2.5% of 50 = _____

(C) _____ % of 80 = 12

(B) 4 out of 15 = _____ %

(E) 2.1 out of 60 = _____ %

(K) 20% of _____ = 9

(R) 6% of _____ = 1.92

(D) $1\frac{1}{2}$ % of _____ = 3

(N) $37\frac{1}{2}$ % of 600 = _____

(L) _____ = 280% of 7

(M) _____ % of 25 = 35

(A) 18 = _____ % of 54

(W) 110% of _____ = 99

(S) 7 = 0.1% of _____

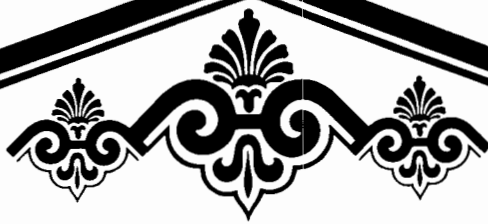
When the Snake Charmer Married the Undertaker, What Did They Have Monogrammed on Their Towels ?



Solve each problem below. Find your answer in the answer column and notice the letter next to it. Write this letter in each box that contains the number of that problem.

- | | |
|---|-------------------------------------|
| <p>① After taking his girl friend out to dinner, Osgood decides to leave a tip of 15% of the bill. If the bill is \$38, how much should the tip be? \$ _____</p> | <p>Ⓜ $36\frac{2}{3}$</p> |
| <p>② Profits of Calculess Corporation this year were 140% of profits last year. If profits last year were \$5200, what were profits this year? \$ _____</p> | <p>ⓗ 1.5</p> |
| <p>③ Klutz got 10 out of 16 problems on an algebra test correct. What percent were correct? _____ %</p> | <p>Ⓡ 12,500</p> |
| <p>④ A team won 13 games, lost 15 games, and tied 2 games. What percent of its games did the team win? _____ %</p> | <p>Ⓛ 5.70</p> |
| <p>⑤ In a magazine drive a school keeps 40% of all sales dollars. How many dollars worth of magazines must be sold for the school to earn \$5000. \$ _____</p> | <p>Ⓣ 4.25</p> |
| <p>⑥ A real estate broker earns $2\frac{1}{2}\%$ of her sales as a commission. How many dollars in sales does she need in order to earn a commission of \$1000? \$ _____</p> | <p>ⓓ $62\frac{1}{2}$</p> |
| <p>⑦ A steel cable expands 0.2% of its length when its temperature is increased 100°C. How much longer will a 750 meter cable become with this increase in temperature? _____ m</p> | <p>Ⓝ 40,000</p> |
| <p>⑧ Elmo Buckets made 54 out of 80 free throws. What percent did he miss? _____ %</p> | <p>ⓐ 7280</p> |
| | <p>Ⓞ 7160</p> |
| | <p>Ⓢ $32\frac{1}{2}$</p> |
| | <p>Ⓛ 36,000</p> |
| | <p>ⓔ $43\frac{1}{3}$</p> |

7	1	8	8	2	6	3	7	4	2	5	8	4
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Why Did the Termite Like Expensive Hotels?

Solve each problem below. Find your answer in the answer column and notice the two letters next to it. Write these letters in the two boxes that contain the number of that exercise.

- ① The price of an Instazoom camera increased from \$75 to \$90. Find the percent of increase in price.
- ② The number of students attending Sky High School increased from 1500 to 1700. What was the percent of increase?
- ③ Because of improved technology, the time needed to manufacture an XYZ machine has fallen from 20 hours to 9 hours. Find the percent of decrease.
- ④ After two weeks on the Try-No-Meal Diet, Thelda's weight dropped from 60 kg to 56 kg. Find the percent of decrease.
- ⑤ During one year, the value of a diamond increased 25%. If the diamond was originally worth \$3000, what was it worth one year later?
- ⑥ During June a car dealer sold 250 new cars. During July he sold 14% fewer cars. How many cars did he sell in July?
- ⑦ At the close of one business day, TNT stock was trading at \$40 per share. At the close of the next business day, the stock was trading at \$43 per share. Find the percent of increase.
- ⑧ A \$150 bicycle is on sale at a 20% discount. If there is a 5% sales tax, how much does the bicycle cost in all?

- | | |
|----|-------------------|
| RS | 12.5% |
| ET | 215 |
| OO | $13\frac{1}{3}\%$ |
| LE | \$3675 |
| SU | \$126 |
| DA | 20% |
| IT | 64% |
| HA | \$3750 |
| ER | 224 |
| HE | 55% |
| TH | 7.5% |
| MS | $8\frac{1}{3}\%$ |
| IT | $6\frac{2}{3}\%$ |
| PO | \$132 |

3	3	5	5	1	1	8	8	4	4	6	6	2	2	7	7
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What Do You Call a Wristwatch to Be Worn in the 23rd Century?

Solve each formula below for the indicated letter. Circle the letter next to your answer. Write this letter in the box at the bottom of the page that contains the number of that exercise.

$d = rt$, for r (E) $r = \frac{d}{t}$ (L) $r = dt$ ①	$A = \frac{abc}{4r}$, for r (H) $r = \frac{A}{4abc}$ (U) $r = \frac{abc}{4A}$ ⑤	$\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$, for f (A) $f = \frac{pq}{q-p}$ (U) $f = \frac{pq}{p+q}$ ⑨	$\frac{A}{B} = \frac{C}{D}$, for C (S) $C = \frac{AD}{B}$ (N) $C = \frac{BD}{A}$ ⑬												
$a = \frac{F}{m}$, for F (N) $F = \frac{m}{a}$ (T) $F = ma$ ②	$\frac{P}{Q} = \frac{R}{S}$, for S (A) $S = \frac{QR}{P}$ (I) $S = \frac{QP}{R}$ ⑥	$\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$, for p (S) $p = \frac{q+f}{qf}$ (F) $p = \frac{qf}{q-f}$ ⑩	$A = \frac{h(a+b)}{2}$, for b (K) $b = \frac{2A}{h} - a$ (E) $b = \frac{ah}{2A}$ ⑭												
$P = \frac{w}{t}$, for t (S) $t = \frac{P}{w}$ (R) $t = \frac{w}{P}$ ③	$a = \frac{v-i}{t}$, for v (I) $v = at+i$ (P) $v = a(t-i)$ ⑦	$\frac{1}{R} = \frac{1}{r_1} + \frac{1}{r_2}$, for R (W) $R = \frac{r_1 r_2}{r_1 + r_2}$ (N) $R = \frac{r_1 r_2}{r_1 - r_2}$ ⑪	$V = \frac{Q}{r_1} - \frac{Q}{r_2}$, for Q (S) $Q = \frac{r_1 + r_2}{Vr_1 r_2}$ (T) $Q = \frac{Vr_1 r_2}{r_2 - r_1}$ ⑮												
$h = \frac{V}{B}$, for B (I) $B = \frac{V}{h}$ (V) $B = Vh$ ④	$\frac{E}{e} = \frac{R+r}{r}$, for e (N) $e = \frac{ER}{r}$ (C) $e = \frac{Er}{R+r}$ ⑧	$\frac{1}{t} = \frac{1}{a} + \frac{1}{b}$, for b (S) $b = \frac{at}{t-a}$ (T) $b = \frac{at}{a-t}$ ⑫	$u = F\left(\frac{P}{T} - E\right)$, for P (R) $P = \frac{uT + EFT}{F}$ (E) $P = \frac{uF + ET}{F}$ ⑯												
6	10	5	12	9	3	1	11	16	7	13	2	15	4	8	14

What Did Finnegan Dislike About the Candle-Making Business ?

Solve each problem below. Assume that all interest rates indicate annual simple interest. Find your solution in the answer column and notice the three letters next to it. Write these letters in the three boxes that contain the number of that exercise.

- ① Solve: $0.05(x + 900) = 0.08x$
- ② Solve: $0.065(x - 2000) = 0.04x + 70$
- ③ Sam Quirk invested \$7000, part at 7% and the rest at 11%. If his total return for one year was \$690, how much was invested at each rate?
 _____ at 7%; _____ at 11%
- ④ An investment fund has \$3000 more invested at 8% than it does at 10%. If the annual return from the 8% investment is the same as the annual return from the 10% investment, how much is invested at each rate?
 _____ at 10%; _____ at 8%
- ⑤ Ms. Smyle has \$200 less invested at 9% than she does at $6\frac{1}{2}\%$. If the annual return from the two investments is the same, how much is invested at each rate?
 _____ at $6\frac{1}{2}\%$; _____ at 9%
- ⑥ Sally Snuggle has \$1600 more invested at 5% than she does at 8%. The annual return from the 5% investment is \$17 more than the annual return from the 8% investment. How much is invested at each rate?
 _____ at 8%; _____ at 5%
- ⑦ Merlin invested half of his money at 12%, one fourth at 8%, and the rest at 6%. If the total annual income is \$570, how much was invested altogether?

NSA	\$7200
THE	\$9500; \$12,500
RKO	\$2000; \$5000
BRA	\$750; \$950
ADT	1500
NWI	\$6000
CKE	\$720; \$520
OMA	\$2400; \$4000
NDS	8000
ION	4200
OWO	\$2100; \$3700
HEH	\$12,000; \$15,000
STA	\$2500; \$4500

4	4	4	1	1	1	6	6	6	3	3	3	7	7	7	5	5	5	2	2	2
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Why Is a Plowed Field Like Feathered Game ?



Solve each problem below and find the solution at the bottom of the page.
Write the letters next to the problem in the two boxes above the solution.



- IS** Nuts to You Shoppe sells cashews for \$15 per kg and pecans for \$10 per kg. How many kilograms of each should be mixed in order to get 20 kg of a mixture worth \$12 per kg?
 _____ kg of cashews
 _____ kg of pecans
- ES** Coffee Grounds, Inc., has two kinds of coffee. Coffee A costs \$9 per kg and Coffee B costs \$6 per kg. How many kilograms of each should be combined to obtain 150 kg of a blend worth \$8 per kg?
 _____ kg of Coffee A
 _____ kg of Coffee B
- RT** C and Y Candy Company mixes candy that costs \$6.00 per kg with candy that costs \$4.50 per kg. How many kilograms of each are needed to make a 3 kg box that costs \$15.00?
 _____ kg of \$6.00 candy
 _____ kg of \$4.50 candy
- IT** Trail Snax Corp. mixes raisins that cost \$5.00 per kg with peanuts that cost \$3.80 a kg. How many kilograms of raisins should be mixed with 10 kg of peanuts to obtain a mixture worth \$4.00 per kg?
 _____ kg of raisins
- RI** Ground beef sells for \$4.75 per kg and ground pork sells for \$5.50 per kg. How many kilograms of ground pork should be mixed with 8 kg of ground beef to make a mixture that sells for \$5.10 per kg?
 _____ kg of pork
- PA** Speed Seed Company mixes bluegrass seed that costs \$7.60 per kilogram with ryegrass seed that costs \$6.25 a kg. How many kilograms of bluegrass seed should be mixed with 200 kg of ryegrass seed to make a mixture worth \$7.00 per kg?
 _____ kg of bluegrass
- DG** A card company mixes two varieties of cards. Embossed cards cost \$.65 each, and regular cards \$.40 each. How many cards of each type should be included in an assortment of 25 cards that costs \$14.00?
 _____ embossed cards
 _____ regular cards

90			8			1	10		16	100	1.5
60	2	5	12	175	250	2	15	7	9	50	1.5

What Happened to the Computer Programmer?

Solve each problem below and find the solution in the answer column. Notice the letter next to it. Look for this letter in the string of letters near the bottom of the page and CROSS IT OUT each time it appears. When you finish, write the remaining letters in the rectangle at the bottom of the page.

- 1 How many liters of water must be added to 8 liters of a 40% acid solution to obtain a 10% acid solution?
- 2 How many liters of water must be added to 20 liters of a 70% antifreeze solution to produce a 50% solution?
- 3 Bunson Beaker has 150 grams of a 50% salt solution. How many grams of water must be added to obtain a 20% salt solution?
- 4 How much water must be added to 12 grams of a 90% iodine solution to produce a 25% iodine solution?
- 5 Moonshine has 50 liters of a 70% alcohol solution. How many liters of pure alcohol must be added to obtain an 80% alcohol solution?
- 6 How many kilograms of pure salt must be added to 20 kilograms of a 10% salt solution to obtain a 25% salt solution?
- 7 How much pure acid must be added to 6 milliliters of a 5% acid solution to produce a 40% acid solution?

- (E) 22 l
- (S) 4 kg
- (A) 3.1 ml
- (U) 8 l
- (W) 32.5 g
- (M) 225 g
- (O) 3.5 ml
- (L) 24 l
- (D) 5 l
- (I) 25 l
- (T) 5.5 kg
- (R) 31.2 g
- (H) 240 g

R H L I E S I W O E M N O S T U D O L A M I T O A U R W M A S Y

Answer:

What Do You Call a Chicken Who Eats Clay ?



Solve each problem and find your answer in the rectangle below. Cross out the box containing your answer. When you finish, write the letters from the remaining boxes in the spaces at the bottom of the page.

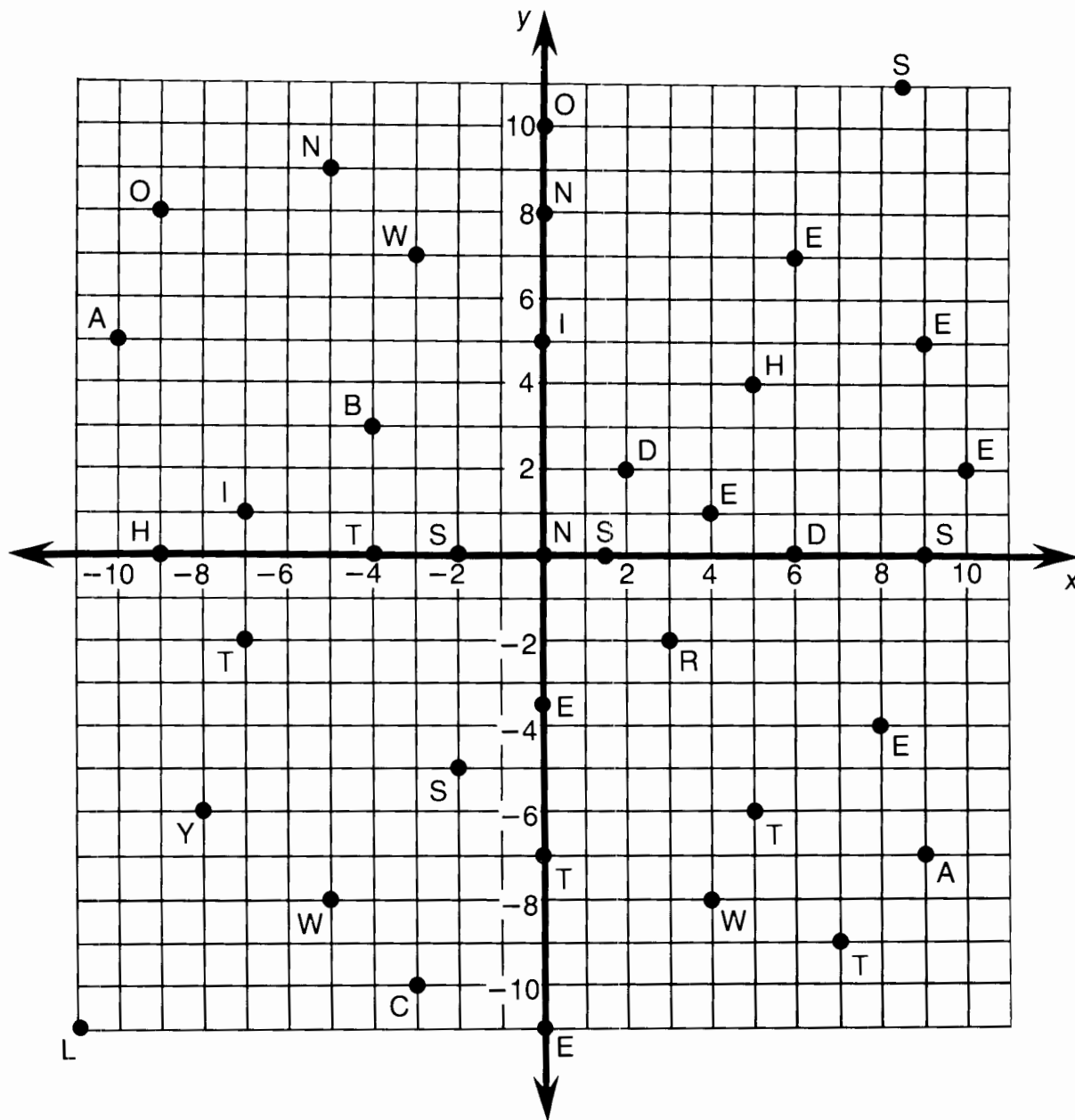
- ① Harry can paint a room in 3 hours, and Kerry can paint it in 4 hours. How long will it take if they work together?
- ② Matthew can build a block wall in 3 days. Andy can build the wall in 5 days. How long will it take if they work together?
- ③ Pump A can fill a tank in 8 hours. Pump B can fill the tank in 6 hours. How long will it take to fill the tank using both pumps?
- ④ To do a job alone, it would take Jennifer 5 hours, Bob 8 hours, and George 10 hours. How long would it take if they all work together?
- ⑤ Susan and Mary working together can rake a lawn in 2 hours. Susan can do the job alone in 3 hours. How long would it take Mary to rake the lawn alone?
- ⑥ Pipe A can empty a pool in 8 hours. If Pipe B is also used, the pool can be emptied in 3 hours. How long would it take Pipe B, by itself, to empty the pool?
- ⑦ Noah can build an ark in 40 days. Together, Noah and his wife can build the ark in 24 days. How long would it take Noah's wife working alone?

CH	AB	AD	IG	R	OP	IC
6 h	58 d	$1\frac{5}{7}$ h	60 d	$2\frac{11}{17}$ h	$1\frac{7}{8}$ d	7 h
H	KL	A	TE	YE	GG	R
$3\frac{3}{7}$ h	$4\frac{7}{8}$ h	$1\frac{2}{3}$ d	$4\frac{4}{5}$ h	75 d	$2\frac{6}{17}$ h	$3\frac{7}{10}$ h

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What Happened After a Burglar Broke Into a Tuba Factory ?

Each ordered pair at the bottom of the page represents a point on the coordinates below. Above each ordered pair, write the letter that appears at that point.



(5, 4)(10, 2)(-3, 7)(-10, 5)(-2, -5)(-3, -10)(3, -2)(8, -4)(6, 0)(0, 5)(-4, 0)(0, -11)(2, 2)

(-5, -8)(-7, 1)(7, -9)(-9, 0)(-7, -2)(4, -8)(6, 7)(-5, 9)(0, -7)(-8, -6)(0, 10)(0, 0)(9, 5)

(9, 0)(5, -6)(-9, 8)(-11, -11)(4, 1)(0, 8)(-4, 3)(9, -7)(-2, 0)(8.5, 11)(0, -3.5)(1.5, 0)

Why Was the Baby Cookie Sad?

Each row across has five boxes. Only three of them contain solutions of the equation at the beginning of that row. CIRCLE these three solutions. Notice the number-letter pair above each solution you have circled. Write the letter in the box at the bottom of the page that contains the matching number.

1	12-S	19-B	5-O	22-L	15-A
	$3x + y = 7$	(2, 1)	(3, -4)	(4, -5)	(0, 5)
2	24-F	9-R	2-I	17-K	19-S
	$-2x + y = 4$	(-2, 1)	(0, 4)	(-3, -2)	(-1, 5)
3	22-O	8-E	20-P	24-G	6-M
	$5x - 2y = 1$	(3, 7)	(-1, -3)	(2, -5)	(1, 2)
4	1-R	17-E	3-Y	11-A	20-O
	$y = 4x - 1$	(2, 5)	(0, -1)	(-1, 6)	(-2, -9)
5	6-T	23-E	18-R	13-V	3-S
	$y = x^2$	(3, 9)	(-2, -4)	(-3, 9)	(5, 10)
6	4-B	13-A	23-N	7-A	1-H
	$y = 2x^2 + 3$	(3, 12)	(1, 5)	(-1, 5)	(0, 6)
7	7-H	14-P	10-W	4-M	21-B
	$-x + 7y = -8$	(1, -1)	(-7, -3)	(8, 0)	(-6, -2)
8	21-L	16-L	16-F	14-P	14-W
	$2xy = 20$	(2, 5)	(-2, 5)	(-2, -5)	(-5, 2)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Why Did Zorna Pour Ketchup on Her Brother's Hand?

Complete the table for each equation. Find each answer in the code key and notice the letter next to it. Write this letter in the box at the bottom of the page that contains the circled number in that row of the table.

1	$y = -2x$				
	x	y			
	1		1		
	4		2		
	-5		3		
	3		4		

2	$y = 4 + 2x$				
	x	y			
	3		5		
	-7		6		
	1		7		
	-3		8		

3	$y = -3x + 1$				
	x	y			
	3		9		
	-3		10		
	4		11		
	-2		12		

4	$y = \frac{1}{2}x - 4$				
	x	y			
	10		13		
	-2		14		
	4		15		
	-8		16		

5	$y = -x + 6$				
	x	y			
	4		17		
	-1		18		
	6		19		
	0		20		

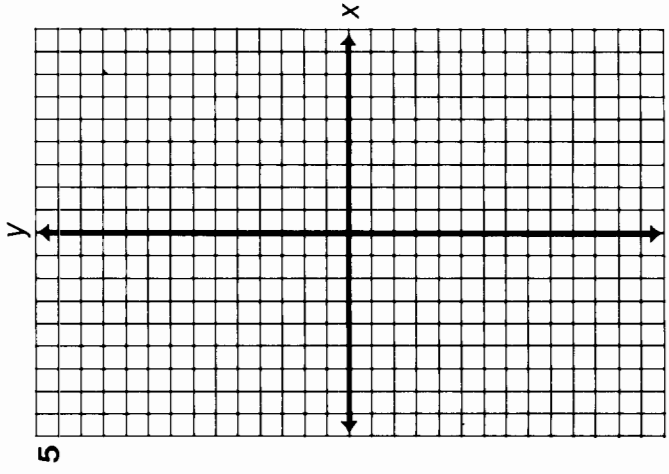
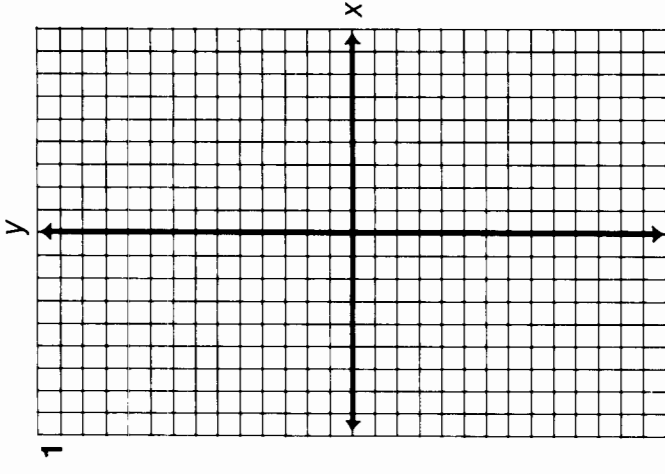
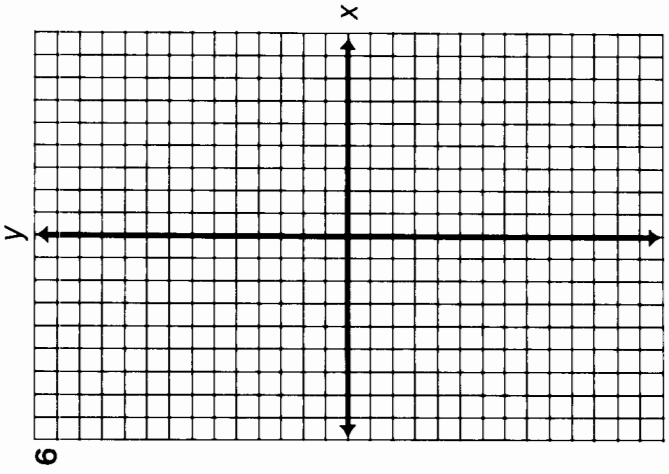
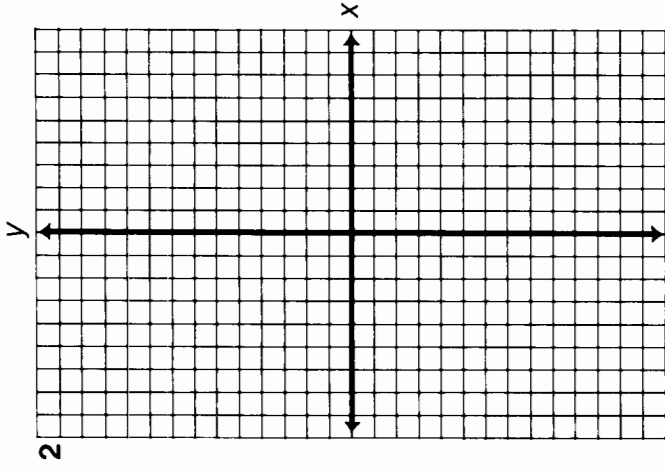
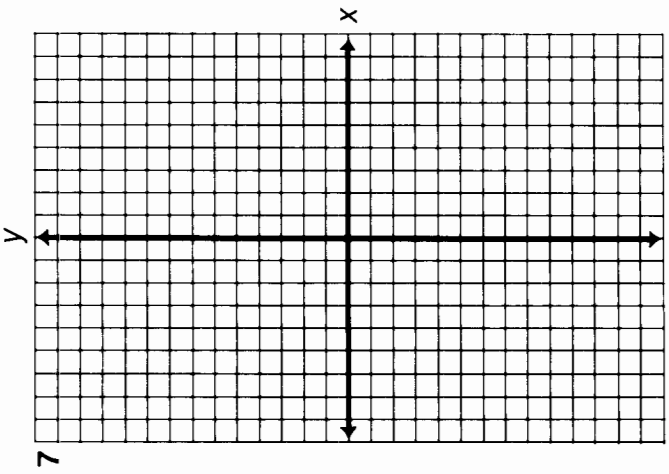
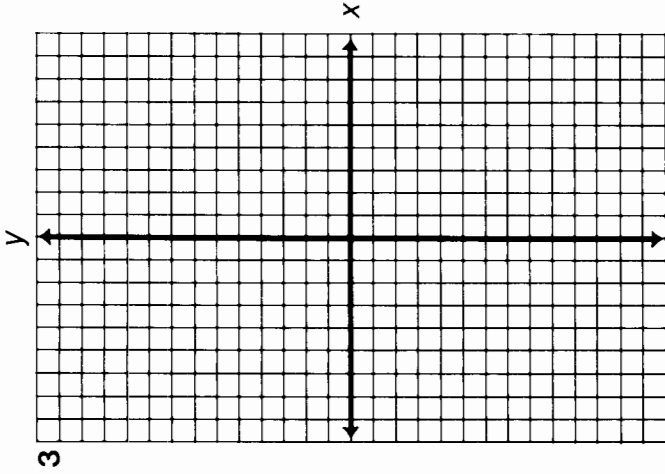
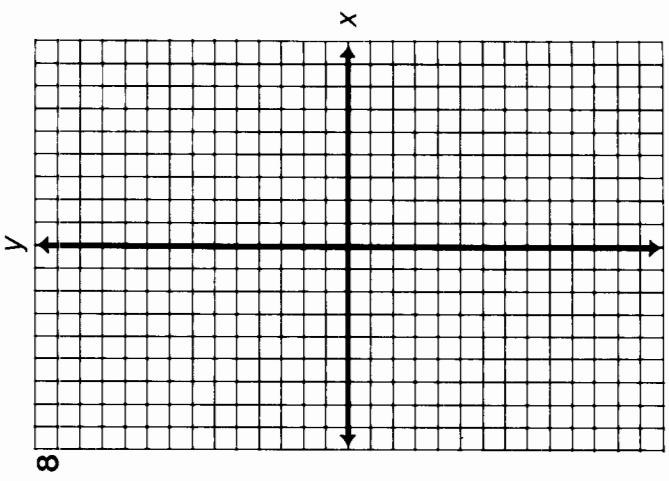
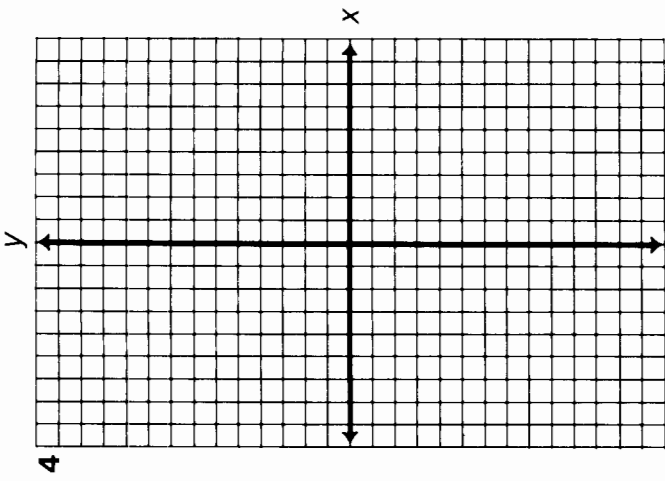
6	$y = -\frac{3}{2}x - 2$				
	x	y			
	4		21		
	2		22		
	0		23		
	-2		24		

7	$y = 7 - 3x$				
	x	y			
	6		25		
	1		26		
	0		27		
	-2		28		

8	$y = 1 - x$				
	x	y			
	-2		29		
	-9		30		
	9		31		
	6		32		

CODE KEY	
13	L
10	R
7	A
6	T
4	P
3	M
2	W
1	I
0	N
-2	H
-5	D
-6	B
-8	E
-10	O
-11	S

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
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CRYPTIC QUIZ

1. Why did the little girl paint spots on the staircase?

Answer:

14 7 4 3 11 14 11 14 15 4 1 9 2 15 15 4 12

2. What do you call a thirty-six-inch two-by-four?

Answer:

11 10 6 13 8 4 12 5 11 12 9

Solve each equation for y in terms of x . Find your answer below and notice the letter next to it. Each time the exercise number appears in the code, write this letter above it.

① $x + y = 5$

② $-3x + y = -2$

③ $x - y = 7$

④ $-4x - y = 1$

⑤ $3x - y = -10$

Answers:

Ⓔ $y = -4x - 1$

Ⓕ $y = 3x - 1$

Ⓟ $y = -x + 5$

Ⓦ $y = x - 7$

Ⓨ $y = 3x + 10$

Ⓞ $y = 3x - 2$

⑥ $-x + 2y = 6$

⑦ $x - 2y = 2$

⑧ $-2x + 3y = -12$

⑨ $5x + 2y = 1$

⑩ $4x - 3y = -2$

Answers:

Ⓓ $y = -\frac{5}{2}x + \frac{1}{2}$

Ⓤ $y = \frac{1}{2}x + 3$

Ⓛ $y = \frac{4}{3}x + \frac{2}{3}$

Ⓖ $y = \frac{3}{4}x - 4$

ⓗ $y = \frac{1}{2}x - 1$

Ⓑ $y = \frac{2}{3}x - 4$

⑪ $3x + 2y - 6 = 0$

⑫ $x - 4y + 2 = 0$

⑬ $-2x - 6y = 0$

⑭ $8y - 3x = -6$

⑮ $7x = 2y$

Answers:

Ⓝ $y = \frac{4}{3}x + \frac{1}{4}$

Ⓢ $y = \frac{3}{8}x - \frac{3}{4}$

Ⓡ $y = \frac{1}{4}x + \frac{1}{2}$

Ⓐ $y = -\frac{3}{2}x + 3$

Ⓣ $y = \frac{7}{2}x$

Ⓜ $y = -\frac{1}{3}x$

What Did the Doctor Say After Examining Yunn Yunsberger?



Complete the table for each function. Find each ordered pair at the bottom of the page and write the corresponding letter above it. (Answers for Exercises 1–4 are to the left, and answers for Exercises 5–8 are to the right of the center line.)



1

$2x + y = 1$	
x	y
-1	A
-4	D
3	O

2

$x - y = 5$	
x	y
7	I
1	E
-2	Y

5

$-2x + 3y = 6$	
x	y
6	D
0	U
-3	E

6

$x + 4y = 12$	
x	y
8	T
0	N
-8	E

3

$3x - y = -4$	
x	y
2	U
-1	A
-3	I

4

$x - 2y = 2$	
x	y
6	V
2	H
-4	C

7

$x + y + 6 = 0$	
x	y
-5	Y
2	N
-8	C

8

$3x = 2y + 8$	
x	y
8	N
2	S
-4	H

(-2, -7)	(3, -5)	(2, 10)	(7, 8)	(2, 0)	(-1, 3)	(6, 2)	(1, -4)	(2, 4)	(-1, 1)	(-4, -3)	(-3, -5)	(-4, 9)	(6, 8)	(7, 2)	(8, 8)	(2, 3)	(6, 6)	(-8, 5)	(8, -2)	(-8, 2)	(-4, -10)	(-3, 0)	(2, -1)	(8, 1)	(-5, 3)	(-5, -1)	(0, 2)	(2, -8)	(0, 3)
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Did You Hear About...

A	B	C	D	E	F
G	H	I	J	K	L
					?

Answers for A–F:

$(2, 0)$; $(0, -6)$ COW
$(2, 0)$; $(0, 3)$ THE
$(4, 0)$; $(0, -2)$ HIS
$(-3, 0)$; $(0, 5)$ WHO
$(4, 0)$; $(0, -3)$ DECIDED
$(2, 0)$; $(0, -4)$ PET
$(2, 0)$; $(0, -3)$ FARMER
$(-3, 0)$; $(0, -5)$ NAMED

Answers for G–L:

$(-6, 0)$; $(0, -\frac{3}{2})$ BECAUSE
$(-3, 0)$; $(0, \frac{3}{2})$ SO
$(\frac{5}{2}, 0)$; $(0, 5)$ ROOSTER
$(3, 0)$; $(0, -4)$ IT
$(-3, 0)$; $(0, \frac{9}{2})$ ROBINSON
$(-3, 0)$; $(0, 3)$ CRACKED
$(5, 0)$; $(0, -2)$ CREW
$(-6, 0)$; $(0, -2)$ UP

Find the x-intercept and the y-intercept of the graph of each equation below. Then find your answer in the answer column nearest the exercise and notice the word under it. Write this word in the box containing the letter of that exercise. Keep working and you will hear about a novel name.

A $3x + 2y = 6$

B $3x - 2y = 6$

C $-5x + 3y = 15$

D $5x + 3y = -15$

E $x - 2y = 4$

F $-2x + y = -4$

G $2x + y = 5$


H $-3x + 2y = 9$

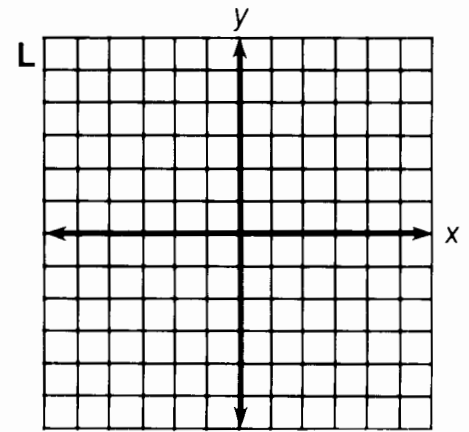
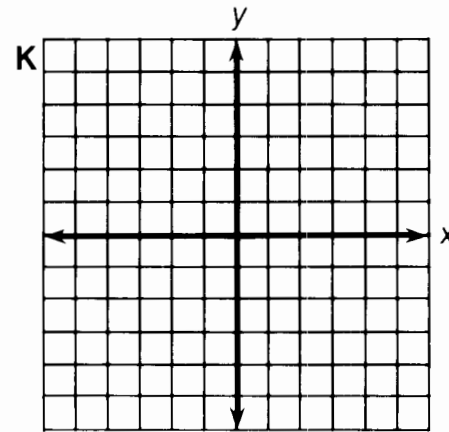
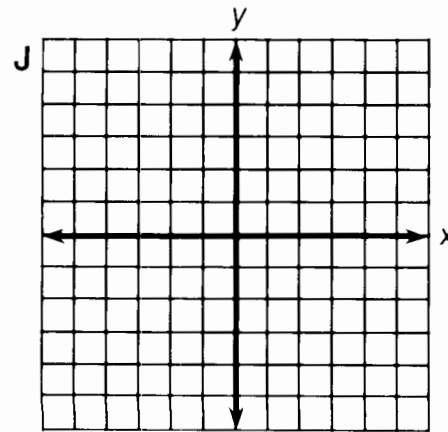
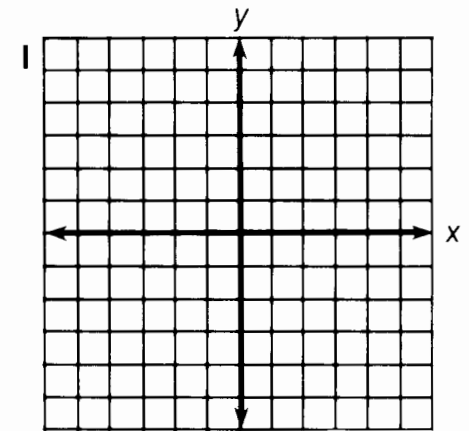
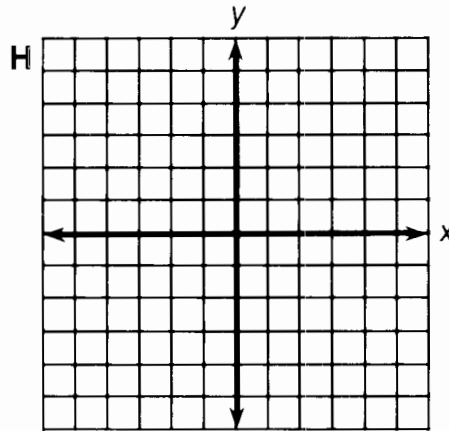
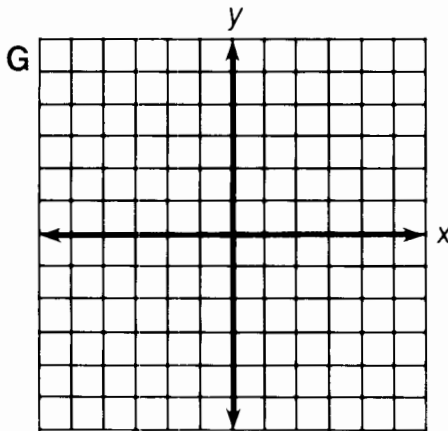
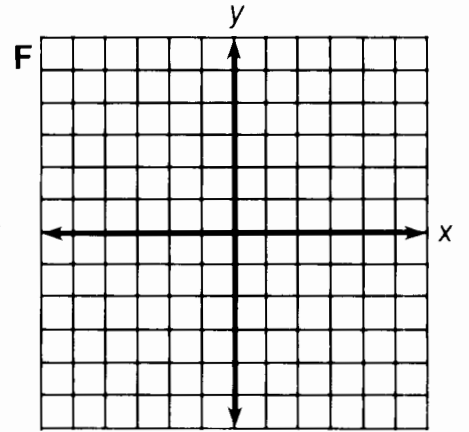
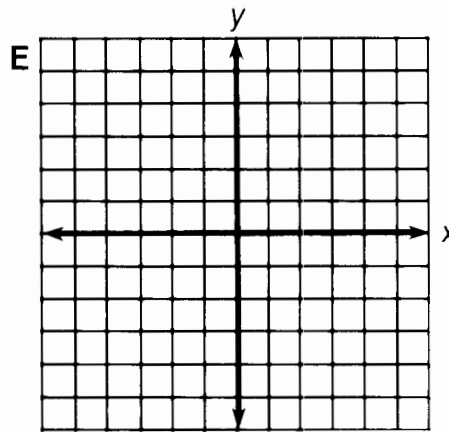
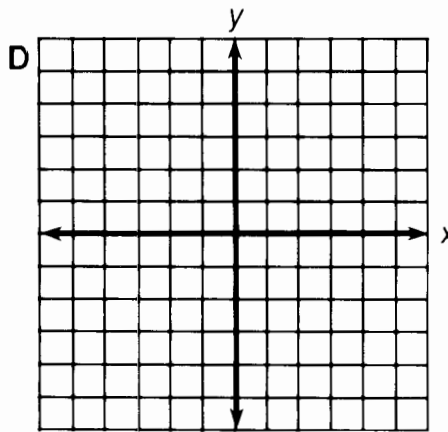
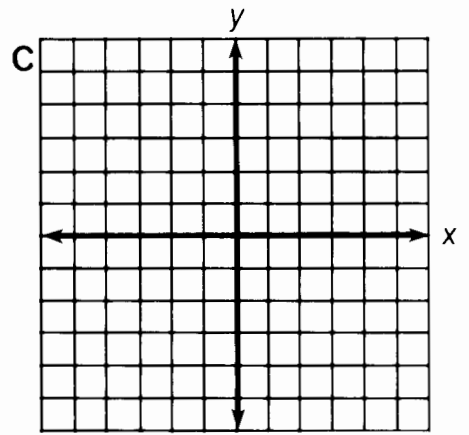
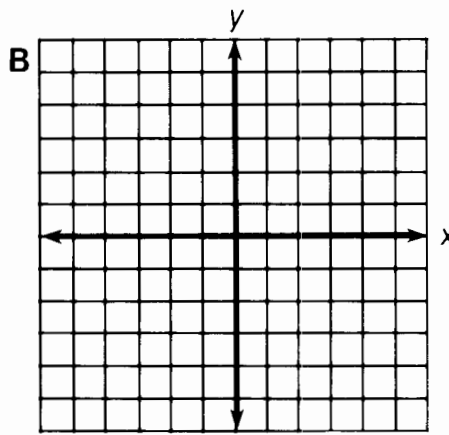
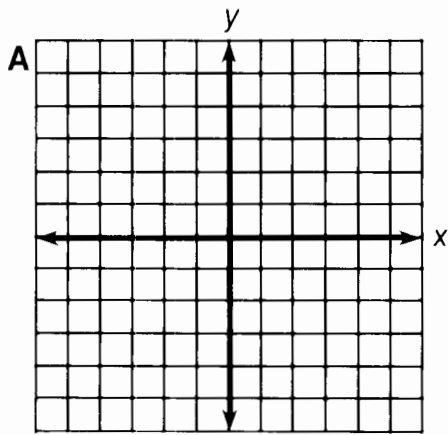
I $-x - 4y = 6$

J $4x - 3y - 12 = 0$

K $5y = 2x - 10$

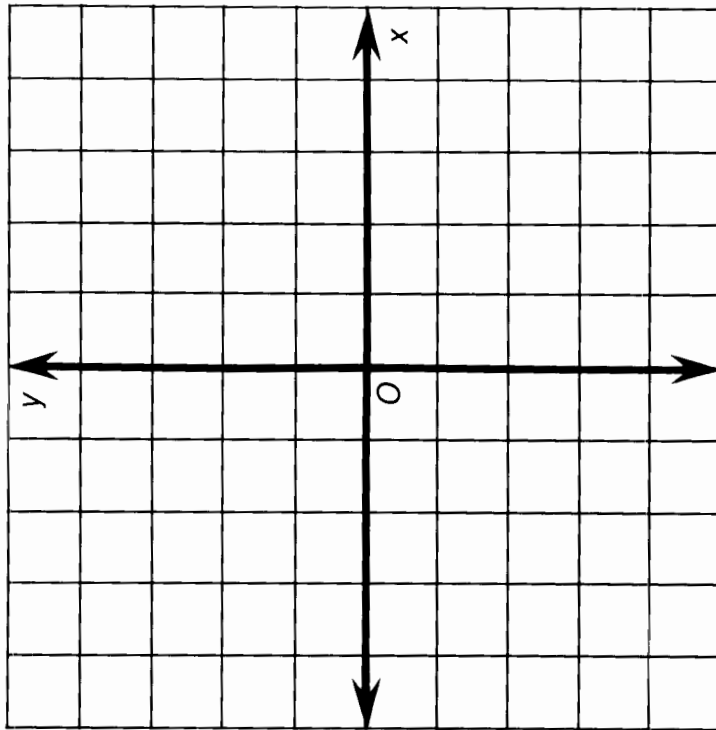
L $x = 2y - 3$





What Might You Have If You Don't Feel Well ?

For each exercise, draw a line through the two given points. Determine the *slope* of this line. Find your answer at the bottom of the page and write the letter of that exercise above it.

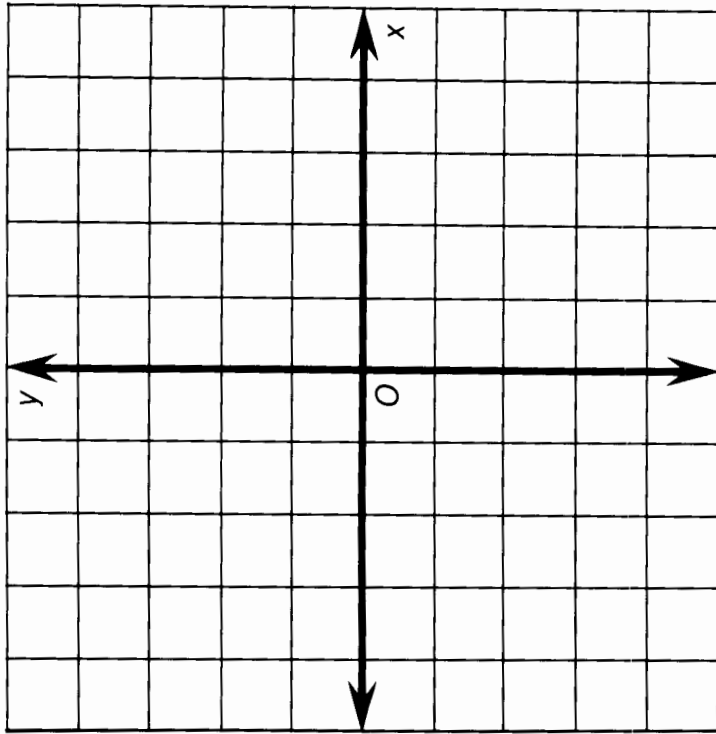


Ⓔ (1, 2) and (4, 4)

Ⓖ (-4, -2) and (2, -5)

ⓐ (3, -3) and (4, 1)

Ⓢ (-2, 4) and (0, -2)



ⓐ (0, -1) and (4, 3)

Ⓥ (-1, 0) and (-3, 4)

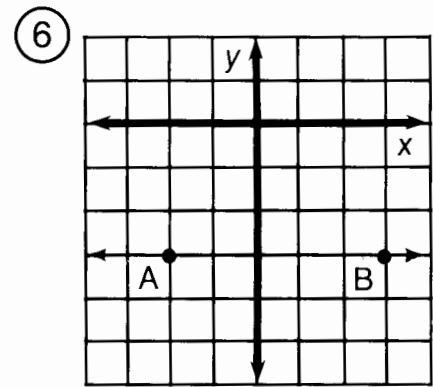
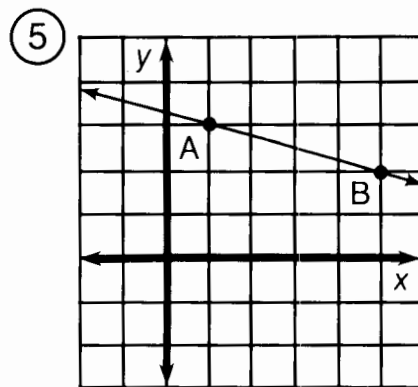
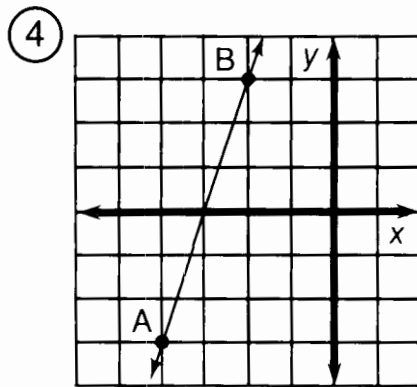
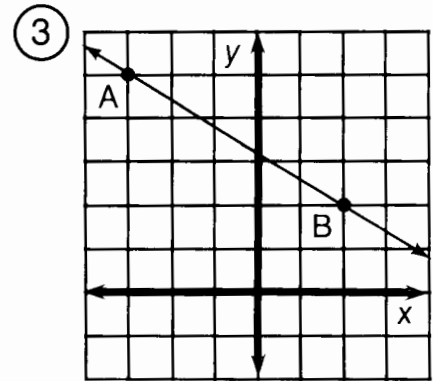
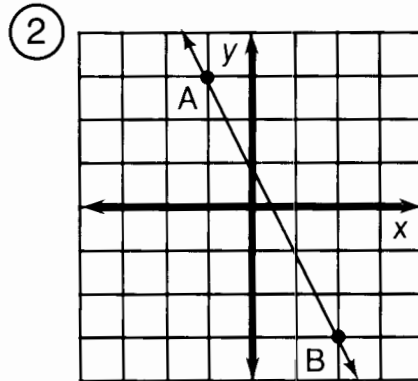
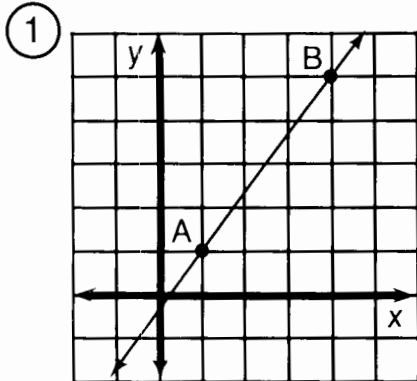
Ⓝ (-5, 2) and (-3, -3)

Ⓛ (5, -1) and (-2, -4)

$-\frac{4}{3}$	$\frac{1}{-2}$	$\frac{3}{7}$	1	-2	$\frac{2}{3}$	$-\frac{3}{3}$	$\frac{7}{3}$	4	$-\frac{5}{-2}$
									0

What Do You Call a Duck That Steals ?

For the first six exercises, find the slope of the line \overleftrightarrow{AB} . For the remaining exercises, find the slope of the line that passes through the two given points. Cross out each box in the rectangle below that contains a correct answer. When you finish, print the letters from the remaining boxes in the spaces at the bottom of the page.



⑦ (2, 1); (5, 3)

⑪ (9, 2); (3, -1)

⑮ (-4, -8); (-2, 0)

⑧ (8, 3); (2, 5)

⑫ (-5, 8); (-4, 2)

⑯ (-3, -3); (0, 0)

⑨ (1, -4); (6, -2)

⑬ (0, -1); (4, -7)

⑰ (2, 5); (9, 1)

⑩ (-3, 1); (-7, 4)

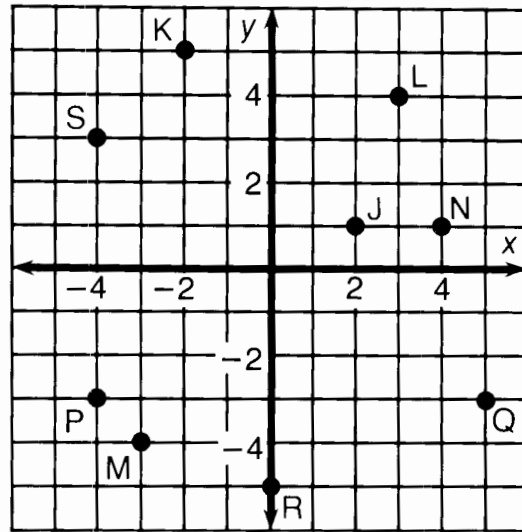
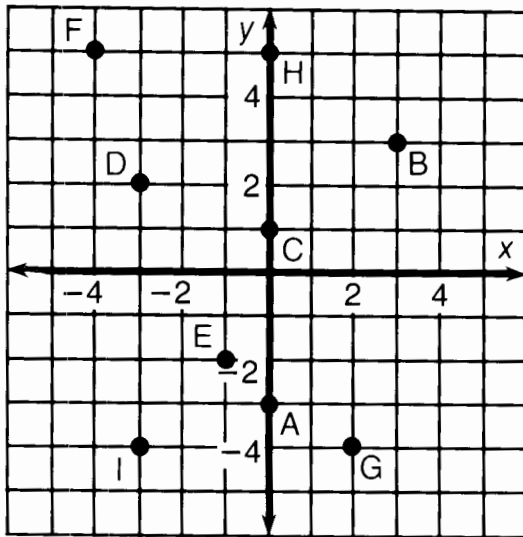
⑭ (1, -1); (-2, -6)

⑱ (0, 0); (-2, 7)

DU	AB	CK	ST	AR	IG	AT	OB	IG	ET	BE	ST
0	-6	$-\frac{3}{5}$	$-\frac{4}{7}$	9	$\frac{1}{2}$	$-\frac{7}{2}$	$-\frac{7}{6}$	$\frac{4}{3}$	$\frac{2}{3}$	$-\frac{5}{4}$	$\frac{5}{3}$
CA	RD	RI	CH	UC	RI	ME	AQ	UA	KY	ET	CK
$\frac{2}{5}$	$\frac{1}{6}$	$-\frac{1}{4}$	-2	-8	$-\frac{3}{2}$	1	$-\frac{1}{3}$	$-\frac{3}{4}$	$\frac{8}{5}$	4	3

What Did the Ape Think of the Grape's House?

For each exercise, draw the line indicated and write its equation. Find your answer in the answer section and notice the two letters next to it. Print these letters in the two boxes at the bottom of the page that contain the number of that exercise.



- ① Equation of \overleftrightarrow{AB} _____
- ② Equation of \overleftrightarrow{CB} _____
- ③ Equation of \overleftrightarrow{DE} _____
- ④ Equation of \overleftrightarrow{FG} _____
- ⑤ Equation of \overleftrightarrow{HI} _____

- ⑥ Equation of \overleftrightarrow{JK} _____
- ⑦ Equation of \overleftrightarrow{LM} _____
- ⑧ Equation of \overleftrightarrow{NS} _____
- ⑨ Equation of \overleftrightarrow{PQ} _____
- ⑩ Equation of \overleftrightarrow{RQ} _____

Answers:

① DE $y = -\frac{1}{4}x + 2$

② TT $y = \frac{2}{5}x$

③ EA $y = -2x + 3$

④ SA $y = \frac{4}{3}x - 1$

⑤ NE $y = \frac{2}{3}x + 1$

⑥ VI $y = \frac{2}{5}x - 5$

⑦ TH $y = -\frac{3}{2}x + 2$

⑧ OU $y = -x + 3$

⑨ TH $y = -2x - 4$

⑩ AS $y = 2x - 3$

⑪ GH $y = -\frac{3}{2}x - 1$

⑫ TI $y = \frac{4}{3}x$

⑬ HE $y = 3x + 5$

⑭ TW $y = -3$

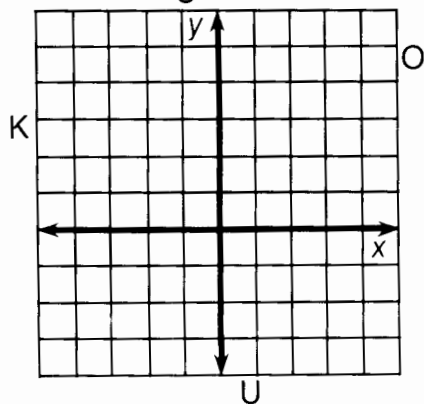
⑮ SH $y = \frac{2}{3}x + 5$

5	5	3	3	6	6	4	4	7	7	9	9	1	1	8	8	10	10	2	2
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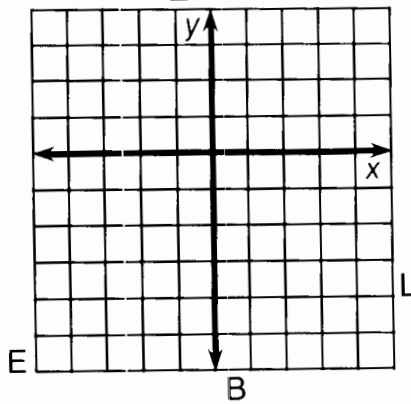
Whom Should You See at the Bank If You Need To Borrow Money?

Use the slope and y -intercept to graph each equation below. The graph, if extended, will cross a letter. Print this letter in each box that contains the number of that exercise.

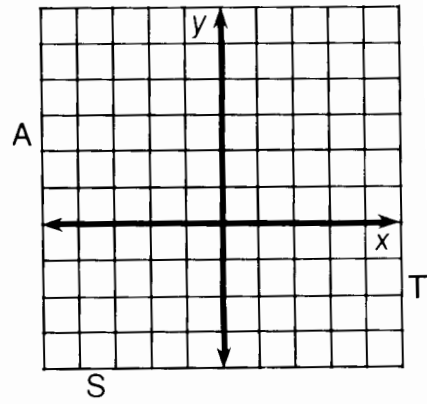
① $y = \frac{2}{3}x + 1$



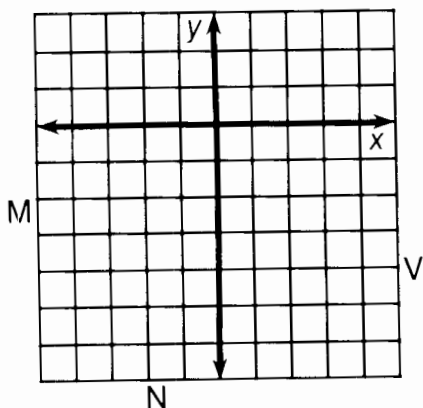
② $y = \frac{1}{2}x - 3$



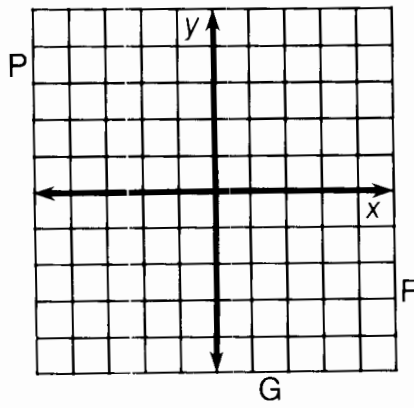
③ $y = -\frac{3}{4}x + 2$



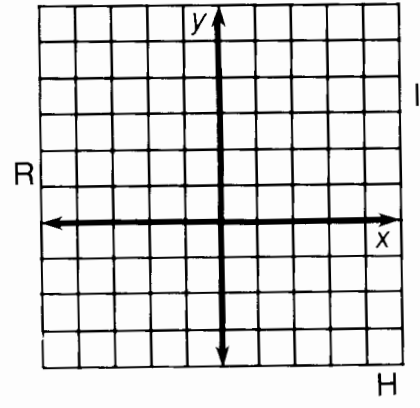
④ $y = 2x - 4$



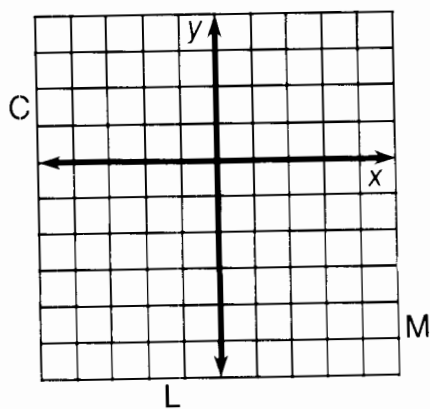
⑤ $y = -3x - 1$



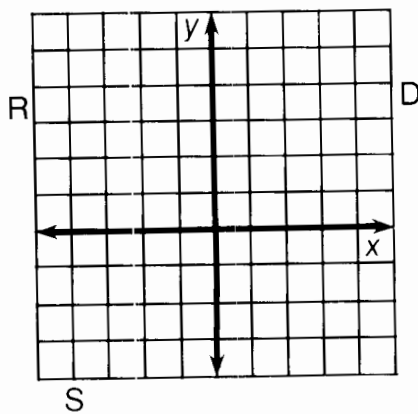
⑥ $y = -\frac{3}{2}x + 3$



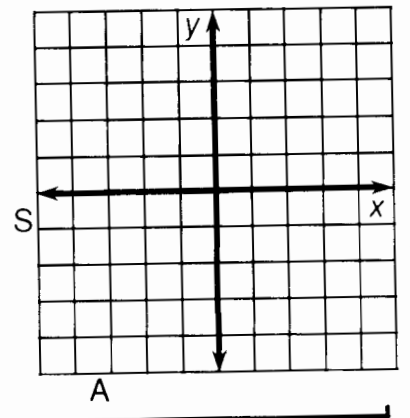
⑦ $y = 4x - 2$



⑧ $y = -\frac{1}{4}x + 2$



⑨ $y = \frac{5}{3}x$



3	6	2	7	1	9	4	9	8	8	9	4	5	2	8
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

According to Some Students, What Is the True Purpose of Homework?



Write each equation below in slope-intercept form. Then find the slope and y-intercept at the bottom of the page. Write the letter of the exercise above them.

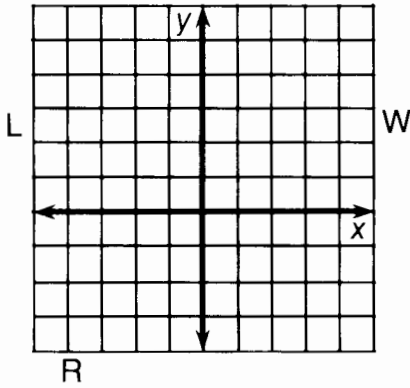
- $2x + 5y = 10$ $-7x - 4y = 16$
 $4x + 3y = 9$ $4x - 2y = 7$ $5x - 9y = -7$
 $-2x + 3y = -21$ $9x + 3y = 1$ $-2x + 7y = 0$
 $-x + 4y = 20$ $6x - y = 4$ $12x = 2y + 1$ $4x - 6y + 3 = 0$
 $3x - 5y = 5$ $4x + 3y = 8$ $x + 4 = 4y$ $y - 2 = 0$

	$\frac{1}{4}$	6	6	-3	$\frac{2}{7}$	$-\frac{2}{5}$	2	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{2}{3}$	0	-3	$\frac{4}{-3}$	$\frac{4}{-3}$	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{7}{-4}$	$\frac{5}{9}$
slope	5	$-\frac{1}{2}$	-4	2	0	2	$-\frac{7}{2}$	2	$-\frac{7}{2}$	$-\frac{1}{2}$	$-\frac{7}{2}$	2	$\frac{1}{3}$	3	$\frac{8}{3}$	-1	1	-4	$\frac{7}{9}$
y-intercept																			

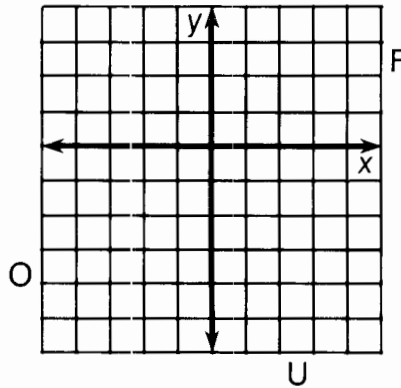
Why Does a Poor Man Drink Coffee ?

Use the slope and y -intercept to graph each equation below. The graph, if extended, will cross a letter. Print this letter in each box that contains the number of that exercise.

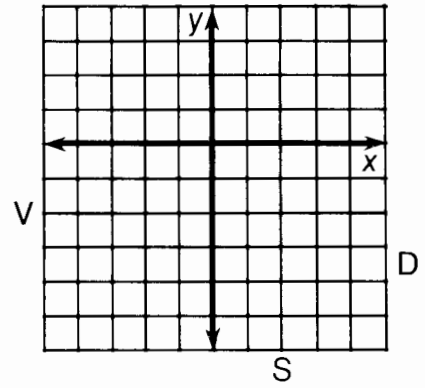
① $-3x + 2y = 2$



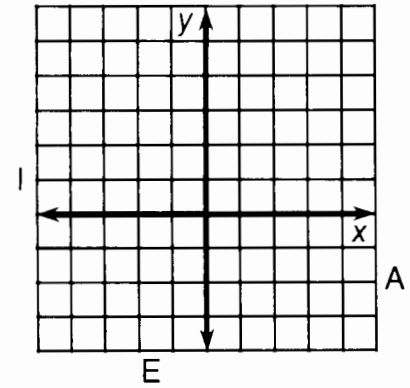
② $x - 4y = 8$



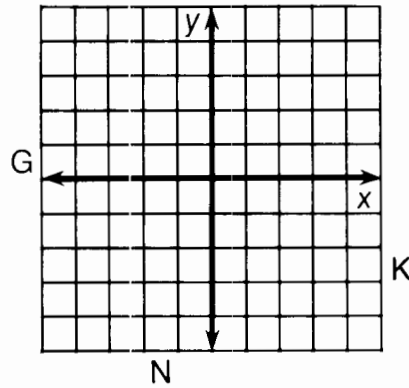
③ $2x + y = -3$



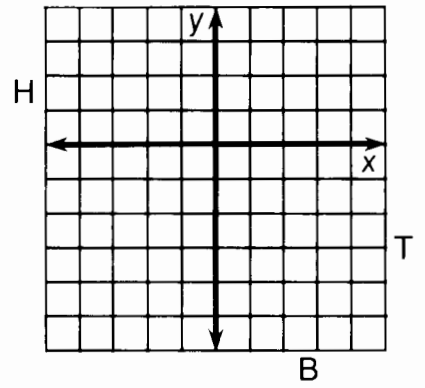
④ $2x + 3y = 6$



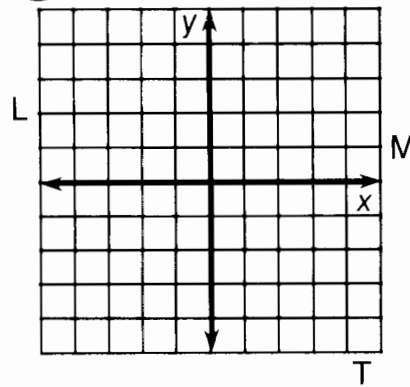
⑤ $3x - y = 1$



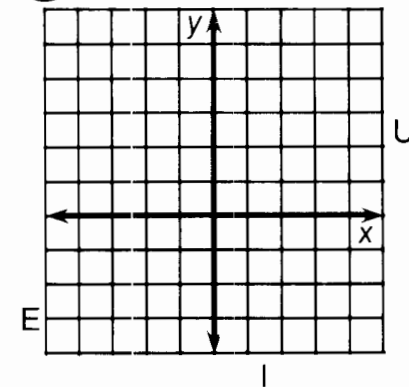
⑥ $-3x - 5y = 10$



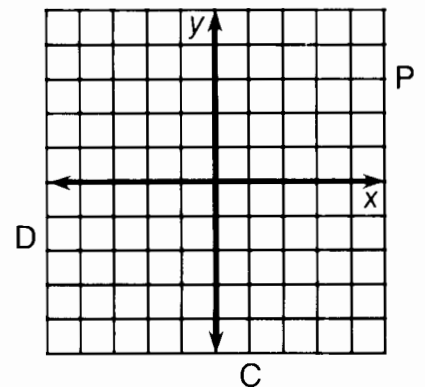
⑦ $4x + 3y = 0$



⑧ $2x - 2y + 5 = 0$



⑨ $y - 3 = 0$

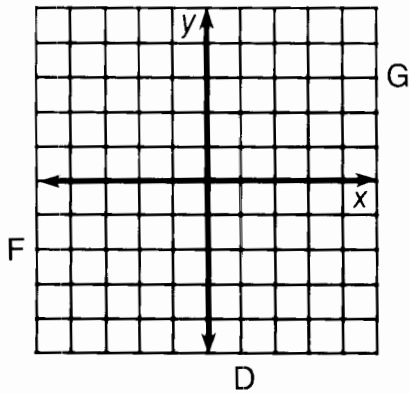


6	8	6	4	3	5	2	9	1	2	9	8	1	7	8	4
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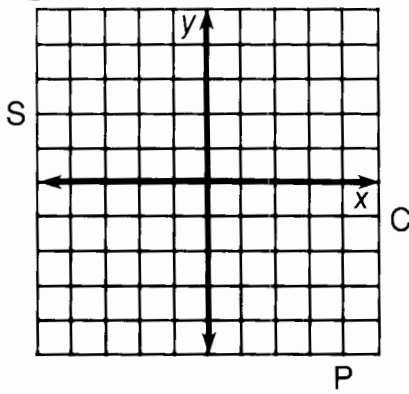
Why Did the Cow Want a Divorce?

Graph each equation below. The graph, if extended, will cross a letter. Look for this letter in the string of letters near the bottom of the page and CROSS IT OUT each time it appears. When you finish, write the remaining letters in the rectangle at the bottom of the page.

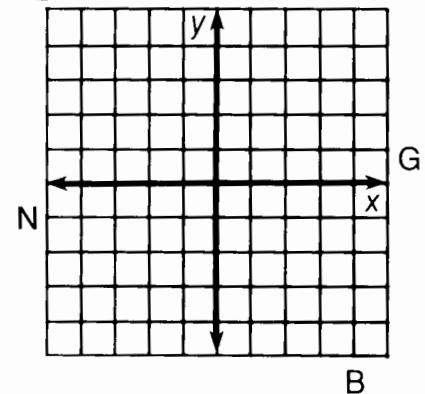
① $y = -2$



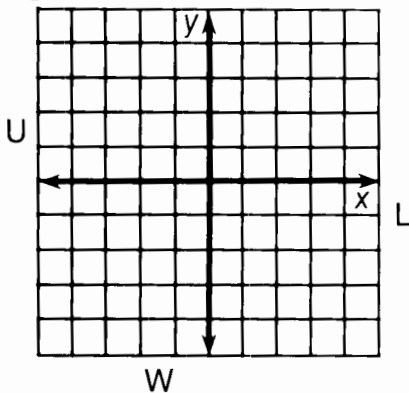
② $x = 4$



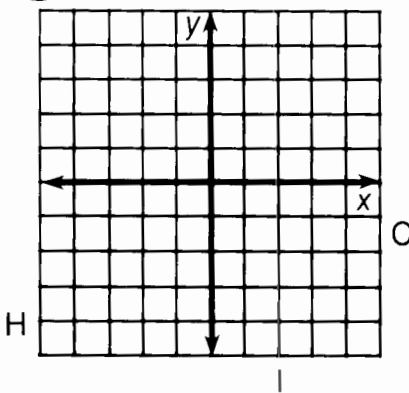
③ $2x - 3y = 9$



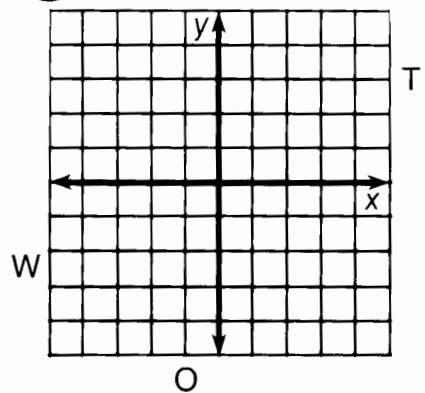
④ $x + 2y - 4 = 0$



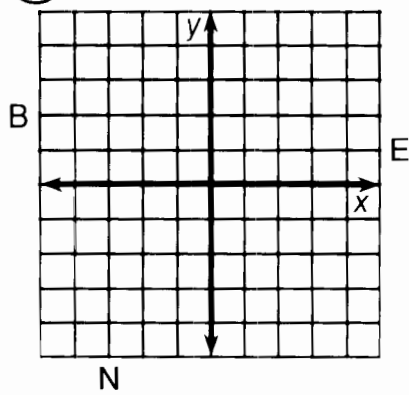
⑤ $3x + 4y = 12$



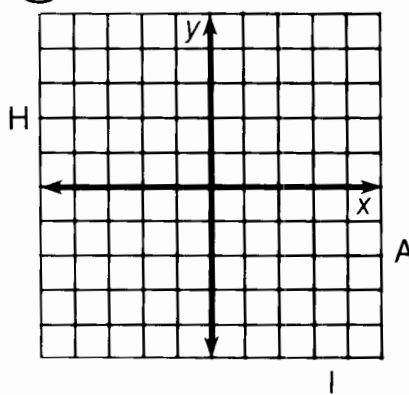
⑥ $6x - 5y + 20 = 0$



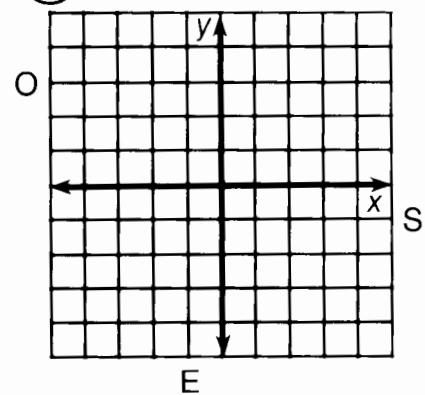
⑦ $x + 3 = 0$



⑧ $2x - 7 = 0$



⑨ $-2x = 2y + 5$



CSIHOWEHOFANDAPLBOIULFGMSIPTOWEIERN

Answer:

Why Did Gyro Go Into a Bakery?



For each exercise below, find the equation of the line that has the given slope and passes through the given point. Circle the letter next to the correct equation. Then write this letter in each box at the bottom of the page that contains the number of that exercise.

① $m = 2; (3, 2)$	G	$y = 2x + 1$	R	$y = 2x - 4$
② $m = -3; (1, 4)$	O	$y = -3x + 7$	P	$y = -3x + 2$
③ $m = -5; (-1, 3)$	M	$y = -5x - 2$	D	$y = -5x + 6$
④ $m = 3; (-4, -7)$	V	$y = 3x + 1$	E	$y = 3x + 5$
⑤ $m = -1; (5, -2)$	U	$y = -x + 3$	C	$y = -x - 1$
⑥ $m = \frac{1}{2}; (6, 1)$	W	$y = \frac{1}{2}x - 5$	H	$y = \frac{1}{2}x - 2$
⑦ $m = -\frac{2}{3}; (3, 4)$	A	$y = -\frac{2}{3}x - 7$	I	$y = -\frac{2}{3}x + 6$
⑧ $m = \frac{4}{3}; (-2, 0)$	K	$y = \frac{4}{3}x + \frac{5}{2}$	F	$y = \frac{4}{3}x + \frac{8}{3}$
⑨ $m = -\frac{1}{4}; (2, 1)$	J	$y = -\frac{1}{4}x + \frac{3}{2}$	D	$y = -\frac{1}{4}x - \frac{3}{8}$
⑩ $m = 4; (-1, \frac{1}{2})$	A	$y = 4x - \frac{2}{3}$	T	$y = 4x + \frac{9}{2}$
⑪ $m = -2; (0, 0)$	L	$y = -2x$	B	$y = -2x - 2$
⑫ $m = 0; (-5, \frac{3}{4})$	S	$y = \frac{3}{4}$	N	$y = -5x$



9	5	12	10	8	2	1	10	6	4	12	3	4	11	11	2	8	7	10
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What Happened When Two Fruit Companies Merged?

For each exercise below, find the equation of the line passing through the given points. Circle the two letters next to the correct equation. Then write these letters in the two boxes at the bottom of the page that contain the number of that exercise.

Answers:

① (1, 5) (2, 7)

IS $y = \frac{2}{3}x + 3$

TH $y = \frac{1}{2}x - 4$

② (0, 1) (3, -8)

AP $y = -\frac{3}{2}x + 8$

UI $y = -3x + 5$

③ (2, -3) (4, -2)

ST $y = \frac{1}{2}x - 7$

DE $y = 2x + 3$

④ (2, 5) (4, 2)

CT $y = -3x + 1$

EY $y = 4x + 7$

⑤ (-3, -5) (-1, 3)

LO $y = -\frac{3}{2}x - 4$

IL $y = 2x + 1$

Answers:

⑥ (3, -1) (-6, -4)

HA $y = \frac{1}{2}x - 1$

ER $y = -\frac{3}{4}x + 4$

⑦ (4, 1) (-4, 7)

IS $y = \frac{1}{3}x + \frac{8}{3}$

EL $y = -2x - 1$

⑧ (-1, 2) (3, 4)

PE $y = -x + 2$

EA $y = -\frac{3}{4}x + 2$

⑨ (-1, -4) (2, 0)

SO $y = \frac{4}{3}x - 2$

AR $y = \frac{1}{3}x - 2$

⑩ (3, -1) (-3, 5)

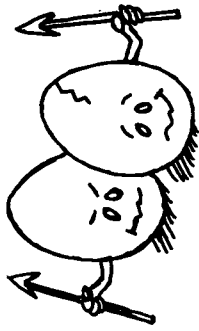
MA $y = \frac{1}{2}x + \frac{5}{2}$

FE $y = \frac{4}{3}x - \frac{8}{3}$

3	3	5	5	8	8	1	1	4	4	7	7	9	9	2	2	10	10	6	6
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What Were the Headlines After a Mad Scientist Trained Two Eggs to Attack a Candy Store With Sharp Sticks?

Solve each system of equations below by graphing. Cross out the box containing your answer. When you finish, print the letters from the remaining boxes in the spaces at the bottom of the page.



① $y = \frac{2}{3}x - 1$

$y = -x + 4$

③ $y = \frac{1}{2}x - 3$

$y = \frac{3}{2}x - 1$

⑤ $x + y = 0$

$3x + y = -4$

⑧ $y = -2$

$2x - 5y = 20$

② $y = -2x + 1$

$y = x - 5$

④ $y = 2x$

$x + y = 3$

⑥ $x = 3 - 3y$

$x + 3y = -6$

⑨ $4x + 3y = -15$

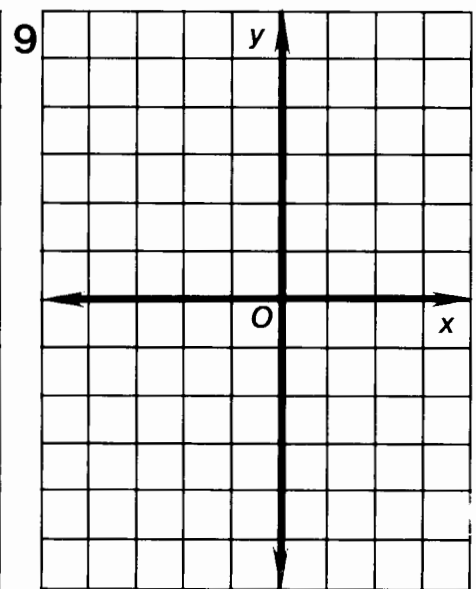
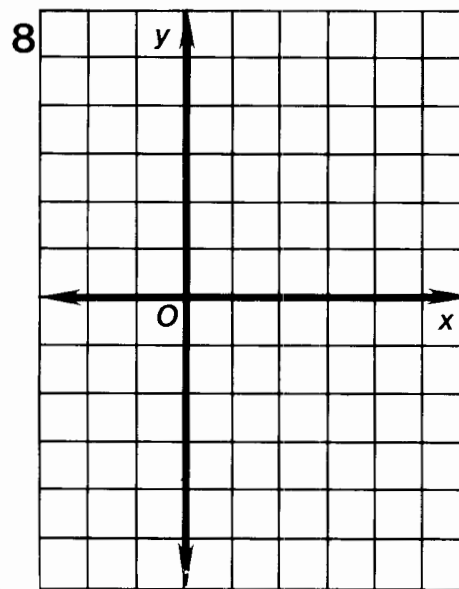
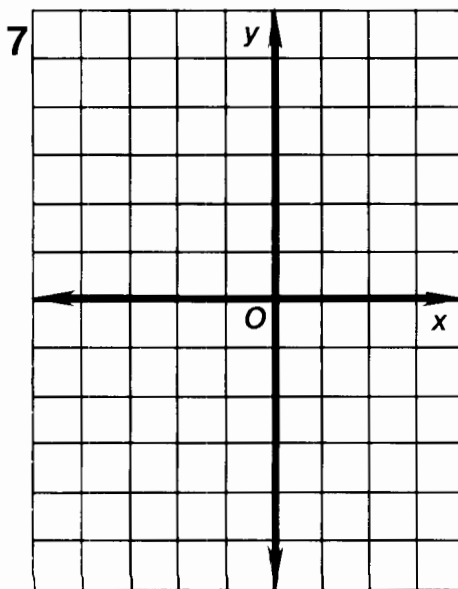
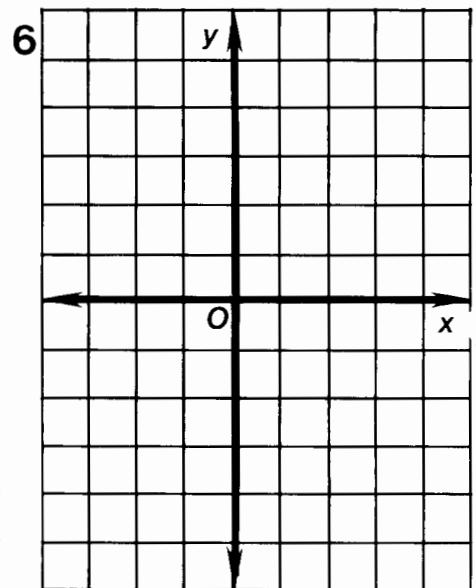
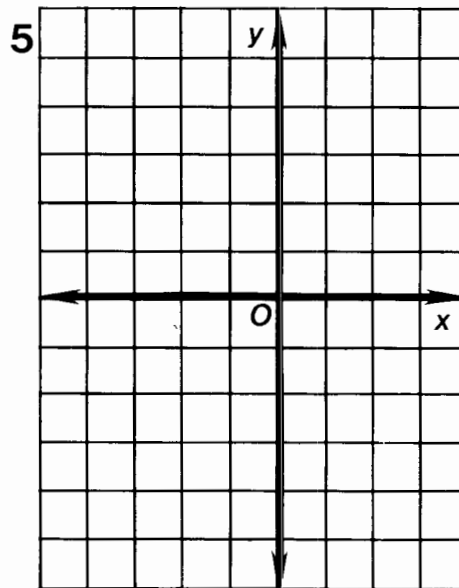
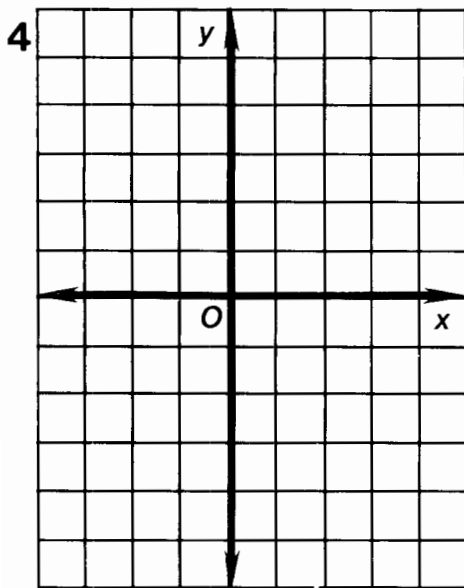
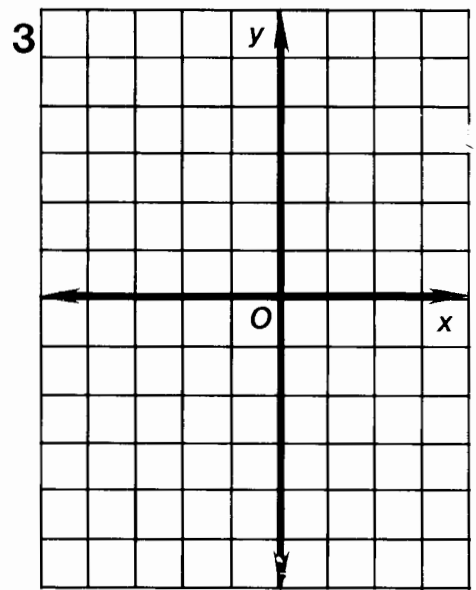
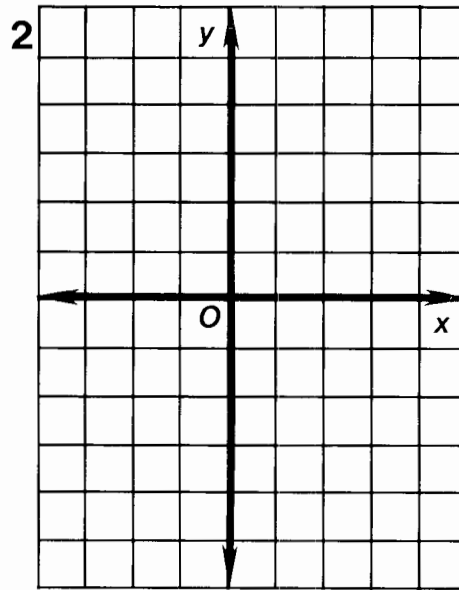
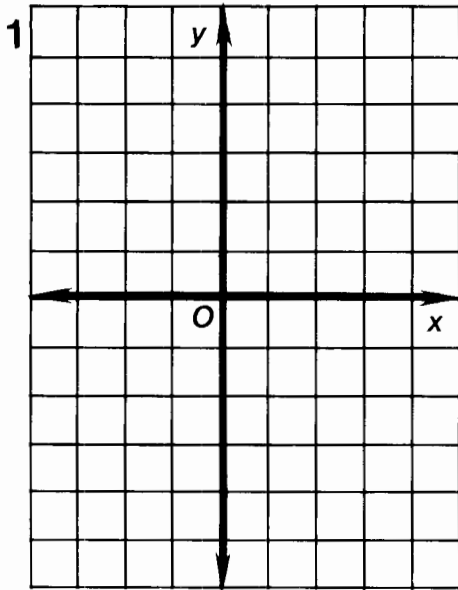
$y = x + 2$

⑦ $x + 2y = -4$

$4y = 3x + 12$

.....

TW	EG	OS	GS	WE	ET	SP	TR
(-4, 0)	(-4, -5)	no solution	(4, 1)	(3, 1)	(-2, -4)	(-1, 6)	(-3, -1)
EA	TS	RA	TI	MI	SS	NT	UP
(-3, 5)	(1, 2)	(0, 3)	(2, -3)	(4, -3)	(5, -2)	(-1, 0)	(-2, 2)



Why Does the President Put Vegetables in His Blender?

Solve each system of equations below by the substitution method. Find the solution in the nearest answer column and notice the two letters next to it. Print these letters in the two boxes at the bottom of the page that contain the number of that exercise.

Answers 1–6:

(4, 2)	LD
(6, -1)	NG
(1, 2)	TR
(4, 8)	HE
(1, -3)	HO
(6, -3)	NT
(5, 3)	FO
(9, 2)	PI
(7, 3)	TH
(5, 2)	IS

Answers 7–12:

$(\frac{1}{2}, -3)$	IN
$(8, -\frac{1}{2})$	VE
$(-\frac{1}{3}, \frac{4}{3})$	RL
(8, 0)	AS
(-3, 4)	TE
$(\frac{1}{2}, 7)$	HI
$(\frac{5}{2}, \frac{4}{3})$	LO
(-1, 4)	RW
$(\frac{5}{2}, -\frac{1}{2})$	PE
(-4, -3)	ED

⑦ $-2x + 3y = 14$
 $x + 2y = 7$

① $y = 2x$
 $x + y = 12$

⑧ $6x - y = -4$
 $2x + 2y = 15$

② $x = 3y - 1$
 $x + 2y = 9$

⑨ $x + y = 1$

③ $y = 2x - 5$
 $4x - y = 7$

⑩ $5x - 3y = -11$
 $x - 2y = 2$

④ $2x - 3y = 12$
 $x = 4y + 1$

⑪ $x - y = 3$
 $6x + 4y = 13$

⑤ $y = -x + 5$
 $x - 4y = 10$

⑫ $2x - y = 16$
 $-x + 2y = -8$

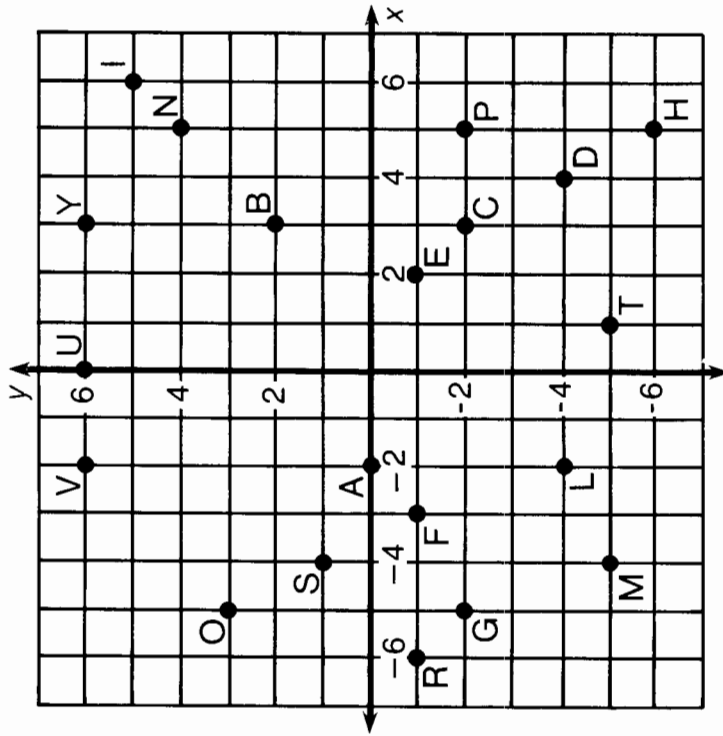
⑥ $x - y = 2$
 $4x - 3y = 11$

1	1	2	2	3	3	4	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12
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What Do You Call It When Someone Pays Back a Loan Quickly?

Solve each system of equations below by the addition method. Find the solution in the coordinate system and notice the letter at that point. Print this letter in each box at the bottom of the page that contains the number of that exercise.

- ① $x + y = 5$
 $3x - y = 7$
- ② $2x + y = 3$
 $-2x + 5y = -9$
- ③ $3x + 5y = 0$
 $2x - 5y = -25$
- ④ $-4x - y = -6$
 $4x + 3y = 18$
- ⑤ $2x - y = -5$
 $-2x - 5y = 11$
- ⑥ $8 = 4x - 3y$
 $17 = x + 3y$
- ⑦ $-6 = 3x + y$
 $10 = -5x - y$
- ⑧ $3x + 8y = -1$
 $-3x + y = -17$
- ⑨ $x + 2y = 15$
 $5x = 2y + 3$
- ⑩ $7x - y = 12$
 $-3y = 7x + 8$
- ⑪ $y = 3x + 13$
 $2x = y - 9$
- ⑫ $4x + 12 = -7y$
 $-y + 12 = 4x$



7	11	4	12	12	2	6	12	2	1	10	8	7	9	3	5	5
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What Kind of Shoes Does a Frog Wear?



Solve each system of equations by the addition method. (You may first have to multiply both sides of one equation by -1 .) Find your answer below and cross out the letter above it. When you finish, the answer to the title question will remain.

- | | | |
|--------------------------------------|-----------------------------------|------------------------------------|
| ① $5x - 2y = 4$
$x + 2y = 8$ | ⑤ $5x + y = 2$
$5x - 3y = 14$ | ⑨ $x + 2y = -2$
$4x + 2y = -17$ |
| ② $-3x + 2y = 11$
$3x - 4y = -19$ | ⑥ $7x - 4y = -10$
$4y = x - 2$ | ⑩ $-6x - 5y = 20$
$-y = 6x + 4$ |
| ③ $3x + y = 13$
$x + y = 3$ | ⑦ $x = 5 - 9y$
$4x + 9y = -7$ | ⑪ $-3x + y = -2$
$-2 = 7x - y$ |
| ④ $6x - 2y = 10$
$x - 2y = -5$ | ⑧ $3x = 5y - 9$
$2y = 3x + 3$ | ⑫ $10x - 5 = 3y$
$2x - 3y = 1$ |

S	H	O	L	D	P	R	E	S	A	N	T	I	O	E	N	A	I	D	R
(0, -4)	(2, 0)	(3, 7)	(1, 3, 2)	(-2, -1)	(-5, 3)	(3, 4)	(2, 2)	(2, 3)	(-4, 1)	(2, -4)	(-2, 2)	(-1, -5)	(-1, 6)	(-1, 4)	(5, -3)	(5, -2)	(-5, 4)	(1, -3)	

Why Are There Rules in Croquet ?

Solve each problem below using a system of two equations in two variables. Find the solution in the answer column and notice the three letters next to it. Write these letters in the three boxes at the bottom of the page that contain the number of that exercise.



- ① The sum of two numbers is 90. Their difference is 18. Find the numbers.
- ② The second of two numbers is 4 more than the first. The sum of the numbers is 56. Find the numbers.
- ③ The number of girls at Sky High School is 60 greater than the number of boys. If there are 1250 students all together, how many girls are there?
- ④ The second of two numbers is 5 more than twice the first. The sum of the numbers is 44. Find the numbers.
- ⑤ The sum of two numbers is 75. The second number is 3 less than twice the first. Find the numbers.
- ⑥ The larger of two numbers is 8 more than four times the smaller. If the larger is increased by four times the smaller, the result is 40. Find the numbers.
- ⑦ The number of calories in a piece of pie is 20 less than three times the number of calories in a scoop of ice cream. The pie and ice cream together have 500 calories. How many calories are in each?
- ⑧ The sum of two numbers is 4 less than twice the larger. If the larger is decreased by three times the smaller, the result is -20 . Find the numbers.

660	THE
655	WEC
38, 52	BEC
16, 12	DER
24, 4	LAW
36, 54	SOT
635	ITW
16, 28	ROQ
13, 31	ANH
24, 32	HER
370, 130	NOR
26, 30	HAT
36, 39	ITB
350, 150	YER
26, 49	AVE

1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6	7	7	7	8	8	8
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Did You Hear About...

A	B	C	D	E	F
G	H	I	J	K	L
					?

Solve each system of equations below using multiplication with the addition method. Find the solution in the answer column and notice the word next to it. Write this word in the box containing the letter of that exercise. Keep working and you will hear about some "udder" nonsense.

(A) $5x - 2y = 4$
 $3x + y = 9$

(G) $3x - 5y = 7$
 $5x - 2y = -1$

(B) $3x - 5y = 13$
 $x - 2y = 5$

(H) $4x + 3y = 9$
 $3x + 4y = 12$

(C) $7x + 2y = -1$
 $3x - 4y = 19$

(I) $5x - 3y = 16$
 $4x + 5y = -2$

(D) $x + 2y = 6$
 $5x + 3y = 2$

(J) $4x - 3y = -20$
 $-x - 8y = 5$

(E) $2x + 3y = 7$
 $3x + 4y = 10$

(K) $-3x + 7y = -1$
 $-2x + 5y = 0$

(F) $7x - 3y = -5$
 $3x + 2y = 11$

(L) $5x + 6y = -11$
 $3x + y = -4$

TWEET	(1, 2)
HIS	(2, 1)
SELLING	(-5, 0)
BIRDSEED	(-1, -2)
UDDER	(2, 0)
THE	(2, 3)
SINGING	(-5, 4)
STARTED	(2, -2)
FED	(-2, 4)
BUTTER	(-1, 3)
COWS	(1, 4)
MILK	(-1, -1)
FARMER	(1, -2)
AND	(0, 3)
WINGS	(2, -4)
WHO	(1, -4)
MOO	(1, 3)
CHEEP	(5, 2)
BEEF	(3, -2)

What Do You Get If You Drop a Grand Piano Down a Mine Shaft?

Solve each system of equations below using multiplication with the addition method. Find the solution at the bottom of the page and write the letter of that exercise in the box above it.

(A) $2(x - y) = 4$
 $3x + y = 10$

(I) $a - 2b = -5$
 $3(2a + b) = 0$

(R) $5x - y = 2x + 9$
 $3x + 4y = -6$

(T) $2(x - 3y) = x + 4$
 $3x + 8 = 5x - y$

(A) $\frac{1}{3}(2x + y) = 1$
 $x + y = 4$

(O) $\frac{1}{2}(m - 3n) = 5$
 $3(m + 4n) = -12$

(F) $\frac{x}{3} + \frac{y}{2} = -4$
 $x - 3y = 6$

(M) $\frac{x}{2} + \frac{y}{5} = \frac{13}{10}$

$3(x - y) = x - 10$

(N) $\frac{1}{5}(x + 2y) = -2$

$\frac{x}{4} - \frac{3y}{2} = \frac{15}{2}$

(L) $\frac{a}{6} + \frac{b}{4} = \frac{5}{2}$

$\frac{2a}{3} - \frac{b}{2} = -2$

(4, -3)	(3, -4)	(-6, -4)	(3, 1)	(2, -5)	(1, 4)	(0, -5)	(2, -3)	(-1, 5)	(-1, 1)	(3, 8)	(4, 0)	(1, -2)	(-1, 2)	(4, -2)	(-6, 0)				

What Kind of Monkey Can Fly?

Solve each problem below using a system of two equations in two variables. Find the solution in the answer column and notice the letter next to it. Write this letter in each box that contains the number of that exercise.

- ① Three times the larger of two numbers is equal to four times the smaller. The sum of the numbers is 21. Find the numbers.
- ② The difference between two numbers is 16. Five times the smaller is the same as 8 less than twice the larger. Find the numbers.
- ③ The larger of two numbers is 1 more than twice the smaller. The sum of the numbers is 20 less than three times the larger. Find the numbers.
- ④ Two records and three tapes cost \$31. Three records and two tapes cost \$29. Find the cost of each record and each tape.
- ⑤ The sum of two numbers is the same as four times the smaller number. If twice the larger is decreased by the smaller, the result is 30. Find the numbers.
- ⑥ A group of students go out for lunch. If two have hamburgers and five have hot dogs, the bill will be \$8.00. If five have hamburgers and two have hot dogs, the bill will be \$9.50. What is the price of a hamburger?
- ⑦ The price of a sweater is \$5 less than twice the price of a shirt. If four sweaters and three shirts cost \$200, find the price of each shirt and each sweater.
- ⑧ A shipment of TV sets, some weighing 30 kg each and the others weighing 50 kg each, has a total weight of 880 kg. If there are 20 TV sets all together, how many weigh 50 kg?

(S)	22, 6
(K)	16, 9
(R)	18, 6
(M)	11, 10
(B)	\$20, \$35
(I)	12, 9
(P)	\$1.35
(N)	13, 6
(O)	14
(T)	\$1.50
(L)	\$8, \$5
(A)	24, 8
(D)	\$23, \$41
(H)	\$5, \$7
(E)	17

2	4	8	6	2	1	5	7	2	7	8	8	3
---	---	---	---	---	---	---	---	---	---	---	---	---

What Do You Call a Cow After She Has a Baby?

Solve each problem using a system of two equations in two variables. Cross out the box that contains your answer. When you finish, write the letters from the remaining boxes in the spaces at the bottom of the page.



- ① A boat travels 60 km upstream (against the current) in 5 hours. The boat travels the same distance downstream in 3 hours. What is the rate of the boat in still water? What is the rate of the current?
- ② When a plane flies into the wind, it can travel 3000 km in 6 hours. When it flies with the wind, it can travel the same distance in 5 hours. Find the rate of the plane in still air and the rate of the wind.
- ③ When Lucy swims with the current, she swims 18 km in 2 hours. Against the current, she can swim only 14 km in the same time. How fast can Lucy swim in still water? What is the rate of the current?
- ④ With the wind, a jet can fly 2500 km in 2 h 30 min. Against the wind, it can fly only 2000 km in the same time. Find the rate of the jet in still air and the rate of the wind.
- ⑤ On an upstream trip, a canoe travels 40 km in 5 hours. Downstream, it travels the same distance in half the time. What is the rate of the canoe in still water and the rate of the current?
- ⑥ A duck can fly 2400 m in 10 min with the wind. Against the wind, it can fly only two thirds of this distance in 10 min. How fast could the duck fly in still air? What is the rate of the wind?
- ⑦ With the wind, a plane flew 1400 km in 4 hours. On the return trip, the pilot was forced to land after 1 h 30 min, having traveled only 450 km. Find the rate of the plane in still air and the rate of the wind.
- ⑧ A salmon swims 100 m in 8 min downstream. Upstream, it would take the fish 20 min to swim the same distance. What is the rate of the salmon in still water? What is the rate of the current?

MA	DE	AL	AR	CA	ME	LL
325 km/h	9.5 m/min	16 km/h	8.75 m/min	310 km/h	8 km/h	12 km/h
25 km/h	3 m/min	4 km/h	3.75 m/min	40 km/h	1 km/h	4 km/h
LF	IN	TO	AT	HE	ED	MA
15 km/h	620 km/h	200 m/min	10 km/h	550 km/h	180 m/min	900 km/h
6 km/h	60 km/h	40 m/min	2 km/h	50 km/h	30 m/min	100 km/h

FACTS: A “one-L” Lama is a Tibetan monk.
 A “two-L” Llama is a beast of burden.
QUESTION: What is a “three-L” LLLama?

Solve each problem using a system of two equations in two variables. Find each answer below and cross out the letter above it. When you finish, the answer to the title question will remain.

- 1 Larry is 8 years older than his sister. In 3 years, he will be twice as old as she is now. How old are they now?
- 2 Barry is 8 years older than his sister. In 3 years, he will be twice as old as she will be then. How old is each now?
- 3 Jennifer is 6 years older than Sue. In 4 years, she will be twice as old as Sue was 5 years ago. Find their ages now.
- 4 Adam is 5 years younger than Eve. In 1 year, Eve will be three times as old as Adam was 4 years ago. Find their ages now.
- 5 Jack is twice as old as Jill. In 2 years, Jack will be 4 times as old as Jill was 9 years ago. How old are they now?
- 6 Four years ago, Katie was twice as old as Anne was then. In 6 years, Anne will be the same age that Katie is now. How old is each now?
- 7 Five years ago, Tom was one third as old as his father was then. In 5 years, Tom will be half as old as his father will be then. Find their ages now.



S	A	B	A	E	I	T	G	F	A	T	I	R	M	E
26, 20	30, 24	37, 17	9, 14	19, 11	17, 9	16, 10	18, 12	20, 40	15, 35	13, 5	16, 8	18, 42	38, 19	10, 15

Where Do Electricians Like to Sleep When They Travel?



Solve each problem below using a system of two equations in two variables. Circle your answer in the answer list. When you finish, arrange the letters of the correct answers in order, from the letter of the smallest correct answer to the letter of the largest correct answer. Write the letters in this order in the boxes at the bottom of the page. Can you “digit”?

- ① The sum of the digits of a two-digit number is 9. The value of the number is 12 times the tens digit. Find the number.
- ② The sum of the digits of a two-digit number is 12. If 15 is added to the number, the result is 6 times the units digit. Find the number.
- ③ The sum of the digits of a two-digit number is 8. If the digits of the number are reversed, the new number is 18 less than the original number. Find the number.
- ④ The tens digit of a two-digit number is twice the units digit. If the digits are reversed, the new number is 36 less than the original number. Find the number.
- ⑤ The units digit of a two-digit number is 4 times the tens digit. If the digits are reversed, the new number is 54 more than the original number. Find the number.
- ⑥ The sum of the digits of a two-digit number is 11. If 27 is added to the number, the digits will be reversed. Find the number.
- ⑦ The units digit of a two-digit number is 1 less than 3 times the tens digit. If the digits are reversed, the new number is 45 more than the original number. Find the number.

- | | |
|-----|----|
| (A) | 14 |
| (D) | 92 |
| (N) | 84 |
| (U) | 38 |
| (R) | 45 |
| (C) | 12 |
| (L) | 36 |
| (C) | 42 |
| (P) | 28 |
| (T) | 27 |
| (E) | 87 |
| (G) | 39 |
| (I) | 47 |
| (B) | 85 |
| (N) | 53 |
| (S) | 17 |

Letter of smallest
correct answer →

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← Letter of largest
correct answer

What Did the Lady Say When a Gentleman Asked, “What Has Teeth and Flies Through the Air?”

Solve each problem using a system of two equations in two variables in two variables. Cross out the box that contains your answer. When you finish, write the letters from the remaining boxes in the spaces at the bottom of the page.

- ① Rocky McFist spends a total of \$90 per week for karate lessons and ballet lessons. If the amount spent on karate lessons increases \$10 per week, it will be two thirds of the amount spent on ballet lessons. How much does Rocky spend on ballet lessons? _____
- ② Dr. D. Jones has a total of \$3000 invested in two stocks. Stock A pays dividends at the rate of 6% and Stock B at the rate of 8%. If her dividends from the two stocks total \$220 per year, how much did she invest in each stock?
Stock A _____, Stock B _____
- ③ The recipe for Junky Crunchies requires a total of 8 cups of sugar and flour together. If the recipe had called for $\frac{1}{4}$ cup more sugar, the amount of sugar would be half the amount of flour. How many cups of sugar does the recipe call for? _____

- ④ Ms. U. S. Bonds invested a total of \$4500, some at 9% per year and the rest at 6% per year. The return from the 9% investment exceeds that from the 6% investment by \$180. How much did she invest at each rate?
_____ at 9%, _____ at 6%
- ⑤ Prince Neva Ben Rich takes out two loans. He borrows \$800 more from a credit union that charges 12% interest than from a bank that charges 15% interest. If his interest payments total \$420 annually, how much does he borrow at each rate?
_____ at 12%, _____ at 15%
- ⑥ Tony and Cleo are donating some of their books to a hospital. If Tony contributes half of his books and Cleo gives one third of hers, they will donate a total of 30 books. If Tony gives two fifths of his books and Cleo contributes half of hers, they will donate a total of 31 books. How many books does each have?
Tony _____, Cleo _____

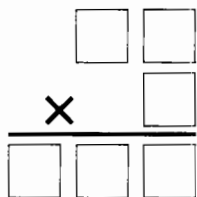
TH	AF	E	AT	LY	IN	TO	GS	A	WS	A	IR	KY
\$1000	\$2500	\$60	40	50	\$1200	\$2000	\$2300	$2\frac{3}{4}$	\$50	$2\frac{1}{2}$	\$3300	\$3000
\$2000	\$2000		30	24	\$1800	\$1200	\$1500				\$1200	\$1500

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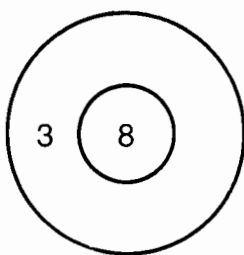
★ ★ ★ ★ TEST OF GENIUS ★ ★ ★ ★

① If a brick balances evenly with three quarters of a pound and three quarters of a brick, what is the weight of a whole brick?

② Arrange the digits 1 through 6 in the six boxes below so that the multiplication works out correctly.

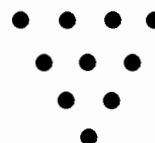


③ An unusual dartboard is shown below. Each dart scores either 3 points or 8 points. Suppose you can throw as many darts as you like, and your score is obtained by adding all the 3s and 8s together. Make a list of *all* the scores that are *impossible* to attain.



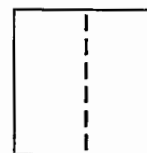
④ Bonzo went to a carnival. At the first game, he paid 10¢ to get in, spent half the money he had left, and spent 10¢ to get out. At the second game, he spent 10¢ to get in, spent half the money he had left, and spent 10¢ to get out. At the third game, he spent 10¢ to get in, spent half the money he had left, and spent 10¢ to get out. Then he found he had no money left. How much money did Bonzo start with?

⑤ Ten bowling pins are set up in the usual way forming a triangle with the point facing the bowler. How can 3 pins be moved so that the 10 pins are still set up in the conventional manner but with the point of the triangle away from the bowler?



⑥ Borfin caught a big fish. Its head was 5 inches long. The tail was as long as the head plus half the body. The body was as long as the head plus the tail. How long was the fish?

⑦ A square piece of paper is folded in half vertically. If the resulting figure has a perimeter of 12 cm, what was the area of the original square?



⑧ What is the value of the following expression:

$$(x - a)(x - b)(x - c) \dots (x - z),$$

so that there are a total of 26 factors, with each letter of the alphabet subtracted from x in one of the factors?



SCORING KEY



- 7 or 8—*Innate Genius*
- 5 or 6—*Great Genius*
- 3 or 4—*Straight Genius*
- 1 or 2—*Late Genius*

What Did the Baby Porcupine Say When It Backed Into a Cactus?



Determine which of the relations below are functions. Find the number of each relation that is a function at the bottom of the page and cross out the letter below it. When you finish, the answer to the title question will remain.

① $\{(-2, 7), (-1, 5), (0, 3), (1, 1), (2, 1)\}$

② $\{(-7, 20), (3, 5), (0, 5), (-2, 0), (6, -4), (-6, -9), (4, 4)\}$

③ $\{(4, 8), (-3, -2), (9, 6), (2, -1), (-4, -5), (2, 7), (-8, 0)\}$

④

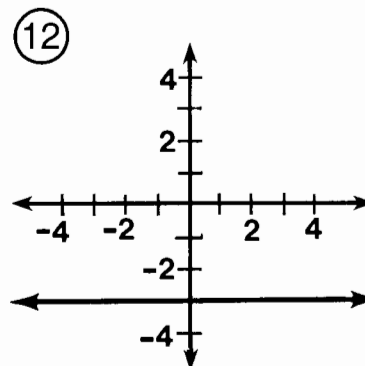
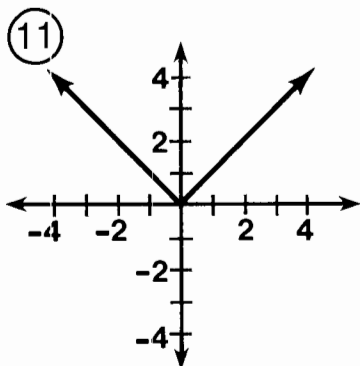
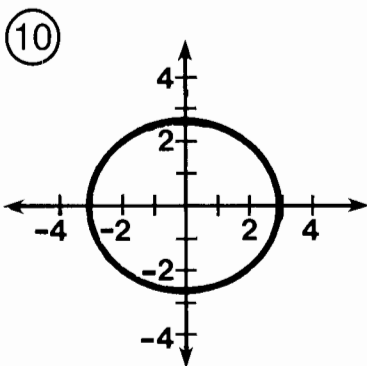
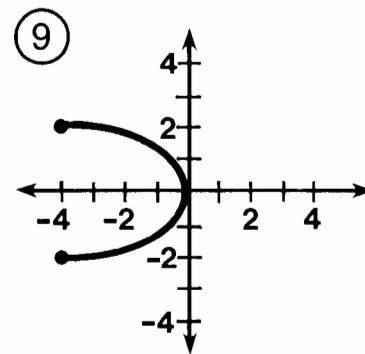
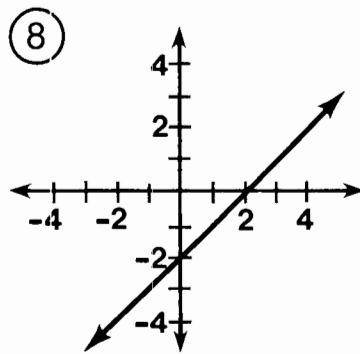
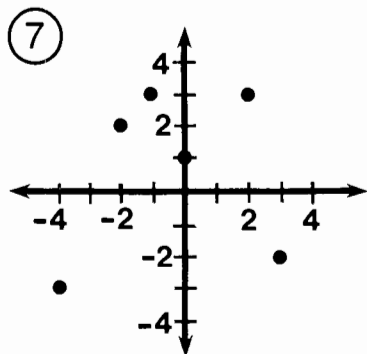
x	y
0	-19
1	-12
2	-4
3	3
4	13
5	27

⑤

x	y
-5	8
-3	8
-1	-2
1	-2
3	11
5	23

⑥

x	y
-2	-7
-2	5
0	-16
2	0
2	6



5	12	10	7	1	3	9	11	2	4	6	8
F	O	H	A	S	I	M	T	O	P	A	D

What Did They Call the Duck Who Became a Test Pilot?

Follow the directions given for each section. Cross out each box in the rectangle below that contains a correct answer. When you finish, print the letters from the remaining boxes in the spaces at the bottom of the page.

I For each function, find the indicated values.

- ① $f(x) = 2x - 5$ A. $f(6)$ B. $f(1)$
 ② $f(x) = x^2 - 4$ A. $f(12)$ B. $f(-2)$
 ③ $g(x) = x^2 - 7x + 1$ A. $g(3)$ B. $g(0)$
 ④ $h(x) = \frac{x+3}{x^2+x-6}$ A. $h(4)$ B. $h(-1)$

II Find the range of each function for the given domain.

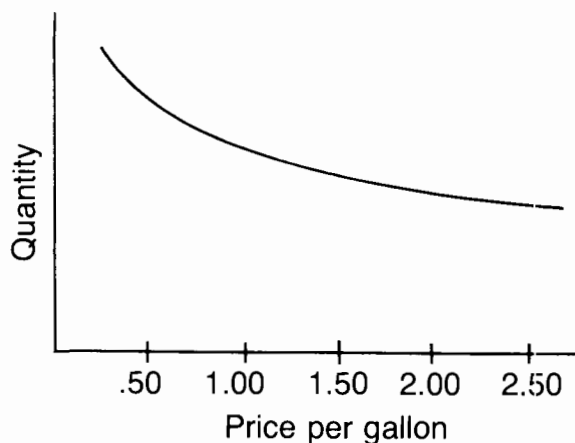
- ⑤ $f(x) = 3x + 2$ $D = \{-2, 0, 2\}$
 ⑥ $g(x) = 9 - 5x$ $D = \{-3, -1, 1\}$
 ⑦ $F(x) = 2x^2 - 1$ $D = \{5, 1, -4\}$
 ⑧ $h(x) = x^2 - 8x + 3$ $D = \{1, 0, -1\}$
 ⑨ $f(t) = \frac{t^2 + 4t}{t - 6}$ $D = \{4, 0, -4\}$
 ⑩ $G(n) = -n^2 + 2n + 3$ $D = \{-2, 1, 4\}$

SK {49, 1, 31}	Y 0	S $\frac{1}{2}$	AF {49, -1, 9}	E {-16, 0}	IL 7	LY {-16, 8, -2}
BE {24, 14, 4}	ER {-5, 0}	ST {-5, 4}	QU $-\frac{3}{2}$	IT $-\frac{1}{3}$	I -3	A {24, 14, -7}
DU -11	CK {-4, 7, 12}	MB 140	IN {-4, 2, 8}	H {-4, 3, 12}	ER {-4, 2, -1}	UP 1

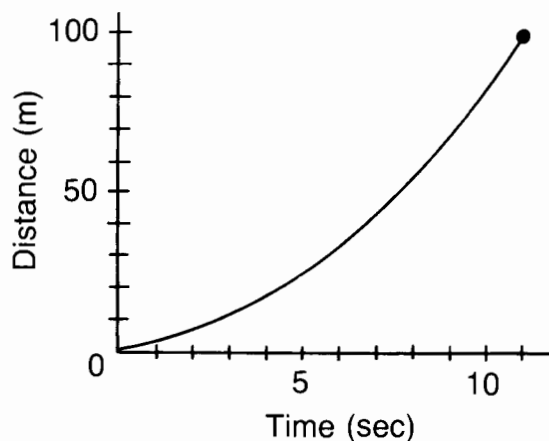
SKETCHING FUNCTIONS I

Study each function below and then answer the questions at the bottom of the page.

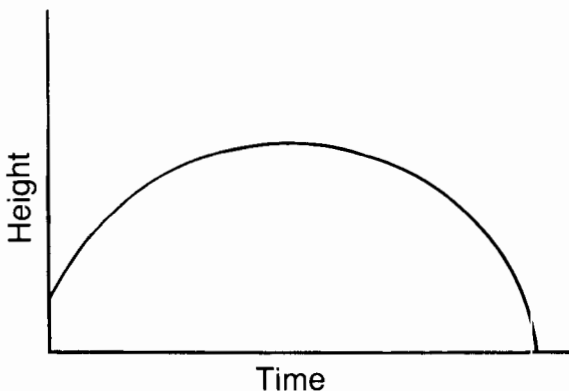
- A. The quantity of gasoline consumed in the U.S. is a function of the price per gallon.



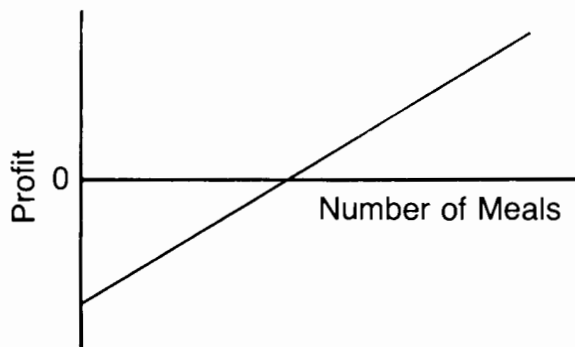
- B. The distance from the starting line of a runner in the 100-meter dash is a function of the time since the start.



- C. The height above ground of a cannon ball shot from a cannon is a function of the time since it was shot.



- D. The profit from a restaurant is a function of the number of meals that are served.



GRAPH A: Does this curve appear to have a positive slope or a negative slope? Why do you suppose this is the case?

GRAPH B: Why does this curve slope more steeply upward as time increases? What is the domain of this function? What is the range?

GRAPH C: When time equals 0, why is the height of the cannon ball not equal to 0? Describe the domain of this function. Describe the range.

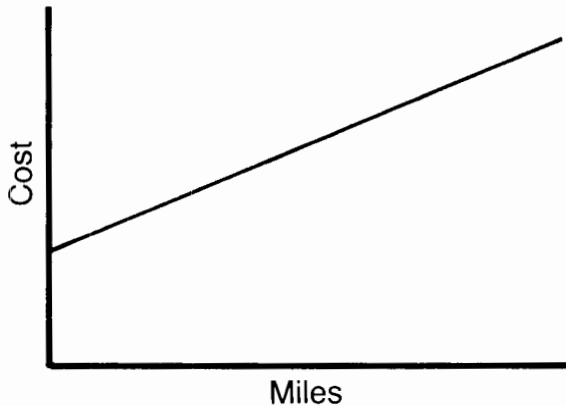
GRAPH D: Why does the range of this function include negative values? What is the significance of the point where the graph crosses the horizontal axis?

OBJECTIVE 1-c: To describe how real-world functional relationships can be represented by graphs, using concepts such as slope, domain, range, and initial conditions.

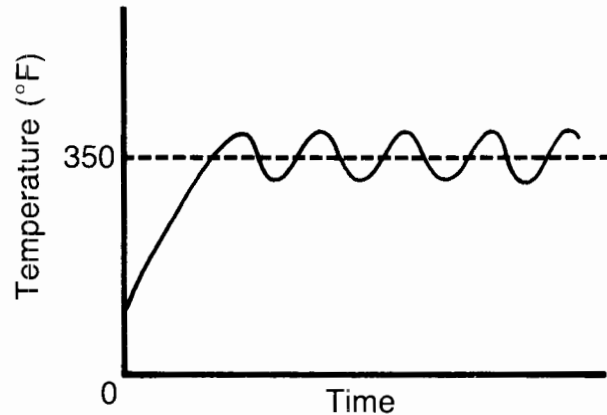
SKETCHING FUNCTIONS II

Study each function below and then answer the questions at the bottom of the page.

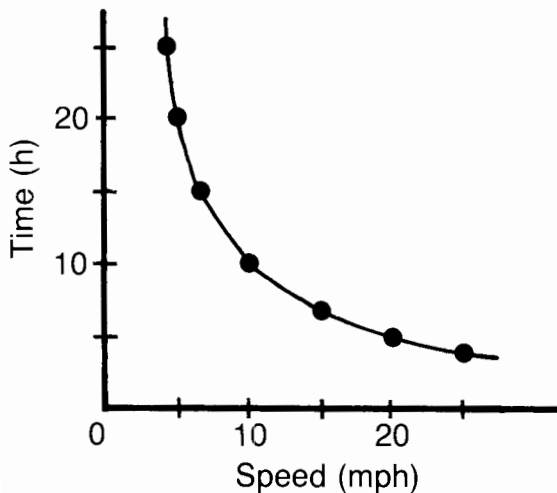
- A. The cost per month of owning a car is a function of the number of miles driven.



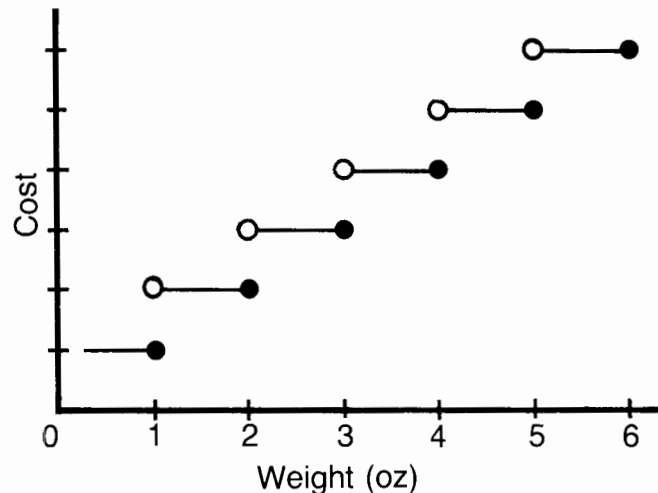
- B. The temperature in an oven set at 350°F is a function of the time since it was turned on.



- C. The time it takes to ride a bicycle 100 miles is a function of the average speed.



- D. The cost of postage for a first-class letter is a function of its weight in ounces.



GRAPH A: When the number of miles driven equals 0, why is the cost per month not equal to 0? Why does the graph have a positive slope?

GRAPH B: When time equals 0, why is the temperature in the oven not equal to 0? Why does the temperature eventually oscillate around 350°F ?

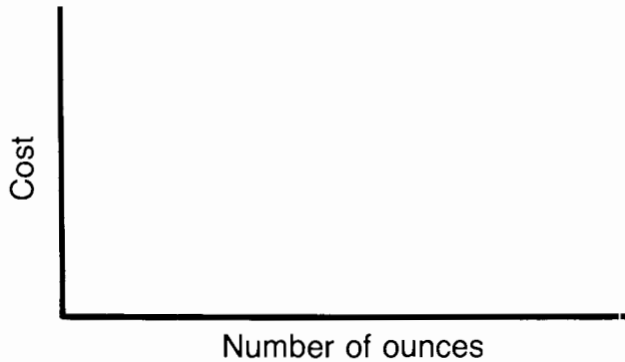
GRAPH C: How long does it take to ride a bicycle 100 miles at each of the following speeds: 5 mph, 10 mph, 15 mph, 20 mph, 25 mph? What is always true about the product $\text{speed} \times \text{time}$?

GRAPH D: Why does the graph look like a series of steps rather than a smooth curve? Why is a hollow circle needed at the beginning of each step (except the first)?

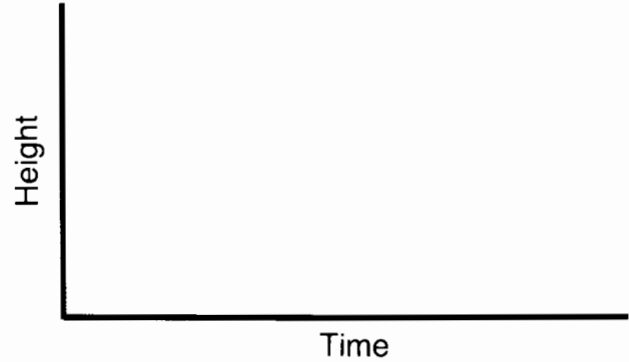
SKETCHING FUNCTIONS III

Make a sketch for each function described below. Use your knowledge of the relationships described.

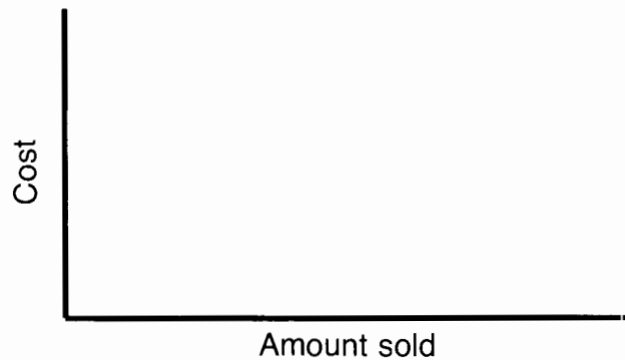
- (A) At a fixed price per ounce, the cost of buying gold is a function of the number of ounces you buy.



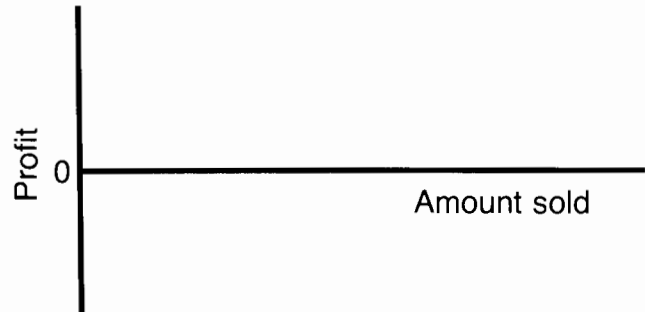
- (B) The height of your head above the ground as you ride a Ferris wheel is a function of the time since you got on.



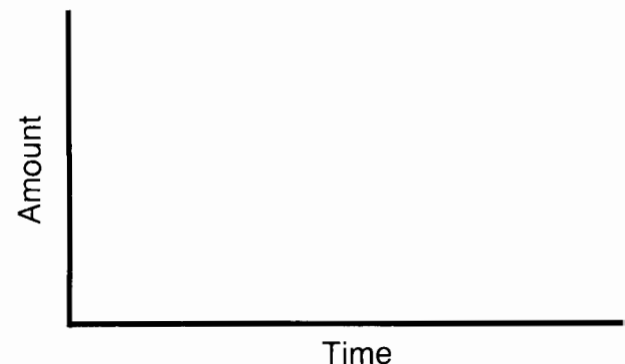
- (C) The total cost of operating a lemonade stand is a function of the amount of lemonade sold.



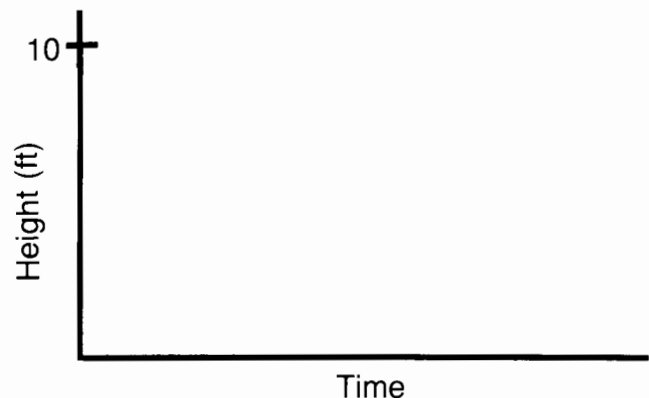
- (D) The profit from operating a lemonade stand is a function of the amount of lemonade sold.



- (E) The amount of water in a pan on a burner that is turned on "high" is a function of the time since the burner was turned on.



- (F) The height of a ball that is dropped from a height of 10 feet is a function of the time since it was dropped.



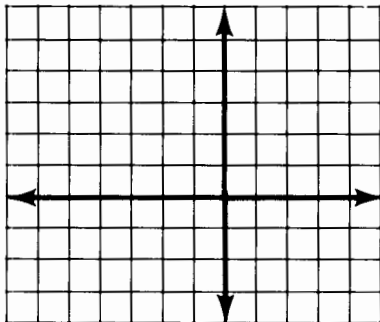
FROM LINEAR TO QUADRATIC

Complete each table and graph the function.



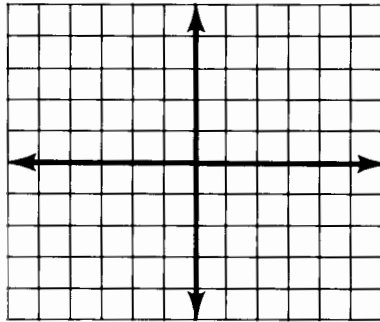
① $y = 2x - 3$

x	y
5	
2	
0	
-1	



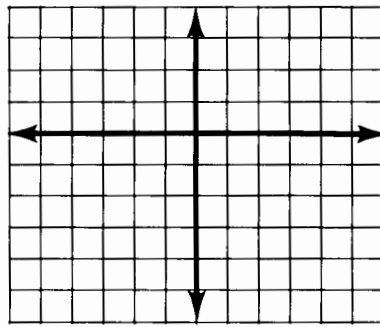
② $y = x^2 - 5$

x	y
3	
2	
1	
0	
-1	
-2	
-3	



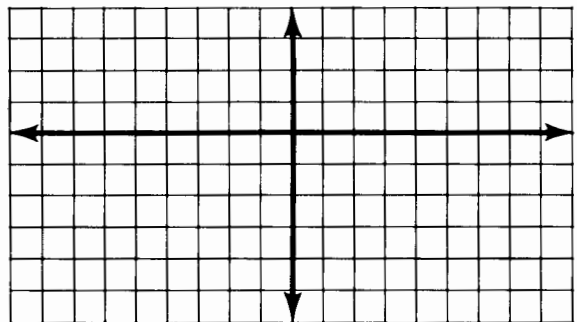
③ $y = x^2 + 4x$

x	y
1	
0	
-1	
-2	
-3	
-4	
-5	



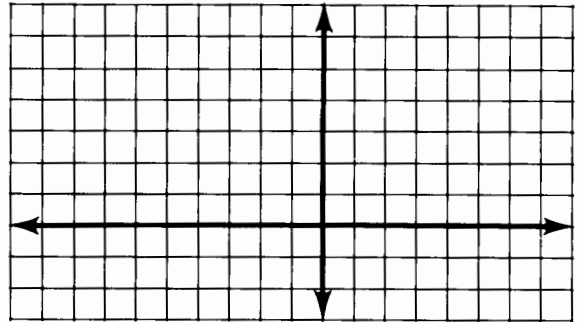
④ $y = x^2 + 2x - 7$

x	y
-5	
-4	
-3	
-2	
-1	
0	
1	
2	
3	



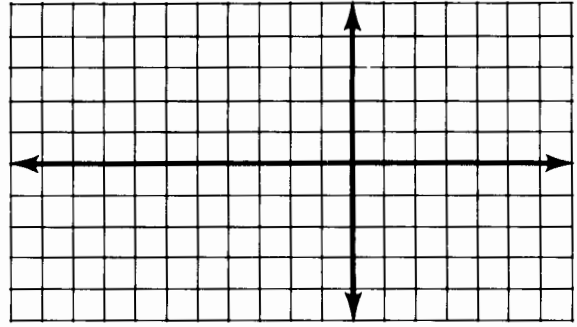
⑤ $y = -x^2 + 6x + 1$

x	y
7	
6	
5	
4	
3	
2	
1	
0	
-1	



⑥ $y = 2x^2 - 4x - 5$

x	y
4	
3	
2	
1	
0	
-1	
-2	



Why Did Grok Jump Up and Down the First Time He Saw a Variable in Algebra Class ?



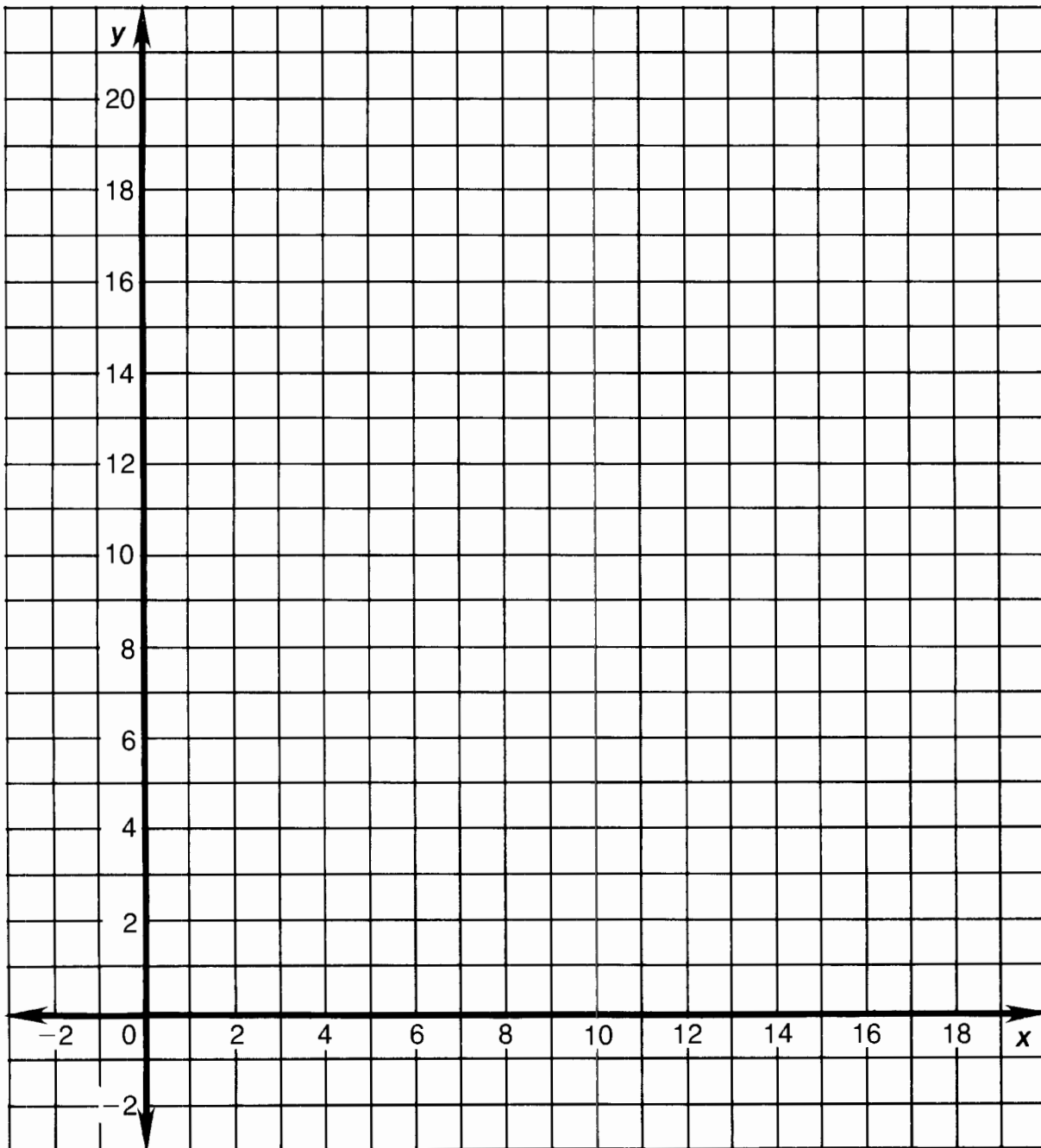
Write an equation expressing direct variation for each exercise below. Find your answer in the answer column and notice the two letters next to it. Write these letters in the two boxes that contain the number of that exercise.

NOTE: Each constant of variation is given in decimal form, unless it equals a *repeating* decimal. Then, it is left as a fraction in lowest terms.

- | | |
|--|--|
| <p>① y varies directly as x, and $y = 20$ when $x = 5$.</p> <p>② y varies directly as x, and $y = 9$ when $x = 27$.</p> <p>③ y varies directly with x, and $y = 40$ when $x = 16$.</p> <p>④ y varies directly with x, and $y = 32$ when $x = 20$.</p> <p>⑤ y is directly proportional to x, and $y = -10$ when $x = -15$.</p> <p>⑥ y is directly proportional to x, and $y = 300$ when $x = -60$.</p> <p>⑦ y is directly proportional to x, and $y = 17$ when $x = 17$.</p> <p>⑧ y varies directly as x, and $y = 1.2$ when $x = 1.6$.</p> <p>⑨ The distance, y, traveled at a fixed rate of speed varies directly with the time of travel, x. Write an equation if $y = 250$ m when $x = 25$ sec.</p> <p>⑩ The amount of interest, y, paid on a loan is directly proportional to the amount borrowed, x. Write an equation if $y = \\$75$ when $x = \\$500$.</p> <p>⑪ The circumference, y, of a circle varies directly with the diameter, x, of the circle. Write an equation if $y = 44$ cm when $x = 14$ cm.</p> | <p>(BI) $y = 6.2x$</p> <p>(NG) $y = 2.5x$</p> <p>(MO) $y = -5x$</p> <p>(VE) $y = 0.45x$</p> <p>(SA) $y = 4x$</p> <p>(SI) $y = 10x$</p> <p>(LL) $y = 3.5x$</p> <p>(NT) $y = \frac{1}{3}x$</p> <p>(ME) $y = 0.75x$</p> <p>(NX) $y = \frac{22}{7}x$</p> <p>(GH) $y = \frac{2}{3}x$</p> <p>(TI) $y = 0.15x$</p> <p>(IT) $y = 1.6x$</p> <p>(NA) $y = 0.13x$</p> <p>(WA) $y = x$</p> <p>(KI) $y = -3.4x$</p> |
|--|--|

4	4	7	7	1	1	11	11	9	9	5	5	10	10	3	3	6	6	8	8	2	2
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Direct Variation "Grafun"



-
1. Why does the graph of an equation expressing direct variation always pass through the origin?
 2. As k increases from 0.15 to 10, what happens to the graph of $y = kx$? Describe the graph when k is negative.
 3. What is the meaning or significance of k in the equation for Exercise 9? For Exercise 10? For Exercise 11?

What Do You Have When a Teacher Tells Two Students to Stop Talking and Do Their Work ?



Solve each problem and find your answer in the rectangle below. Cross out the box that contains your answer. When you finish, write the letters from the remaining boxes in the spaces at the bottom of the page.

1 The amount of money earned on a job is directly proportional to the number of hours worked. If \$36 is earned for 8 hours of work, how much is earned for 30 hours of work?

\$ _____

2 The height that a ball bounces varies directly with the height from which it is dropped. A certain ball bounces 30 cm when dropped from a height of 50 cm. How high will the ball bounce if dropped from a height of 120 cm?

_____ cm

3 The amount that a spring stretches is directly proportional to the weight of the object attached to it. If a spring is stretched 10 cm by a weight of 8 kg, how much will it be stretched by a weight of 3 kg?

_____ cm

4 The number of calories in a container of milk is directly proportional to the amount of milk in the container. If there are 160 calories in an 8-ounce glass of milk, find the number of calories in a 15-ounce glass of milk.

_____ cal

5 The number of kilograms of water in a person's body varies directly as the person's mass. A person with a mass of 90 kg contains 60 kg of water. How many kilograms of water are in a person with a mass of 50 kg?

_____ kg

6 On a certain map, 25 km are represented by 2 cm. If two cities are 7 cm apart on the map, what is the actual distance between them?

_____ km

7 The amount of fertilizer needed for a lawn varies directly with the area of the lawn. If 4 pounds of fertilizer are needed for 500 square feet of lawn, how much is needed for Dr. Quagmire's lawn, which is rectangular in shape and measures 25 feet by 50 feet?

_____ lb

TW	A	TW	NO	OS	WO	RD
3.75	9.4	10	324	$33.\bar{3}$	72	76
ER	NE	ED	IT	PA	N	IR
$31.\bar{6}$	300	144	135	83.5	87.5	4.2

Why Did Miss Muffet Need a Road Map?

Write an equation expressing inverse variation for each exercise below. Find your answer in the corresponding set of answer boxes, and print the letter of the exercise above it.

- (O) y varies inversely as x , and $y = 25$ when $x = 3$.
- (S) y varies inversely as x , and $y = 7$ when $x = 12$.
- (E) y is inversely proportional to x , and $y = 3.5$ when $x = 8$.
- (T) y is inversely proportional to x , and $y = 0.4$ when $x = 0.9$.
- (L) The time, t , it takes to travel a certain distance varies inversely as the speed, s . Write an equation if $t = 10$ h when $s = 80$ km/h.
- (H) The length, ℓ , of a rectangle with a constant area varies inversely as the width, w . Write an equation if $\ell = 7.2$ cm when $w = 5.0$ cm.
- (S) The time, t , required to do a certain job is inversely proportional to the number of people, n , working. Write an equation if $t = 15$ h when $n = 6$.

$t = \frac{820}{s}$	$y = \frac{84}{x}$	$\ell = \frac{36}{w}$	$y = \frac{28}{x}$	$t = \frac{115}{\ell}$	$t = \frac{800}{s}$	$y = \frac{75}{x}$	$t = \frac{90}{n}$
							$y = \frac{0.36}{x}$
							$\ell = \frac{31}{w}$

- (H) y varies inversely as x , and $y = -320$ when $x = -5$.
- (E) y is inversely proportional to x , and $y = 0.125$ when $x = -100$.
- (Y) y varies inversely as x , and $y = -9$ when $x = 28$.
- (R) y is inversely proportional to x , and $y = 2.5$ when $x = 0.4$.
- (H) The number of chairs, y , on a ski lift is inversely proportional to the distance, x , between them. Write an equation if $y = 40$ when $x = 30$ m.
- (E) The force, F , needed to lift an object with a crowbar varies inversely with the length, ℓ , of the crowbar. Write an equation if $F = 200$ kg when $\ell = 1.4$ m.
- (W) The frequency, f , of a sound wave is inversely proportional to the wavelength, ℓ . Write an equation if $f = 420$ Hz when $\ell = 0.8$ m.

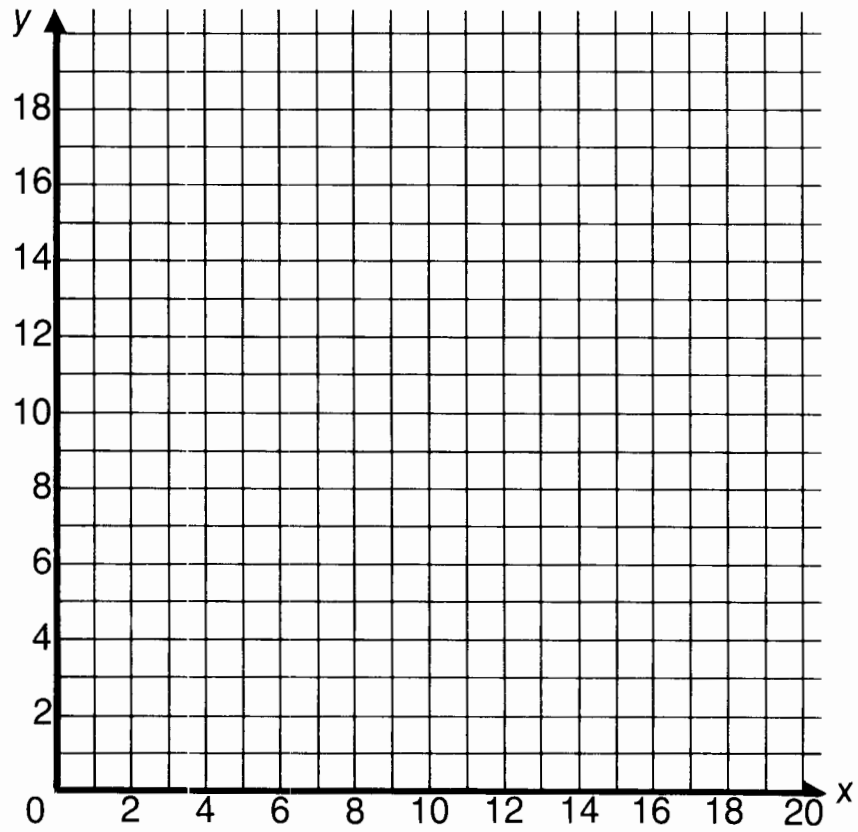
$y = \frac{1800}{x}$	$y = \frac{1200}{x}$	$y = \frac{-12.5}{x}$	$y = \frac{1}{x}$	$f = \frac{324}{\ell}$	$f = \frac{336}{\ell}$	$y = \frac{1600}{x}$	$F = \frac{280}{\ell}$
							$y = \frac{-252}{x}$
							$F = \frac{264}{\ell}$

INVERSE VARIATION "GRAFUN"

Complete each table and graph the equation.

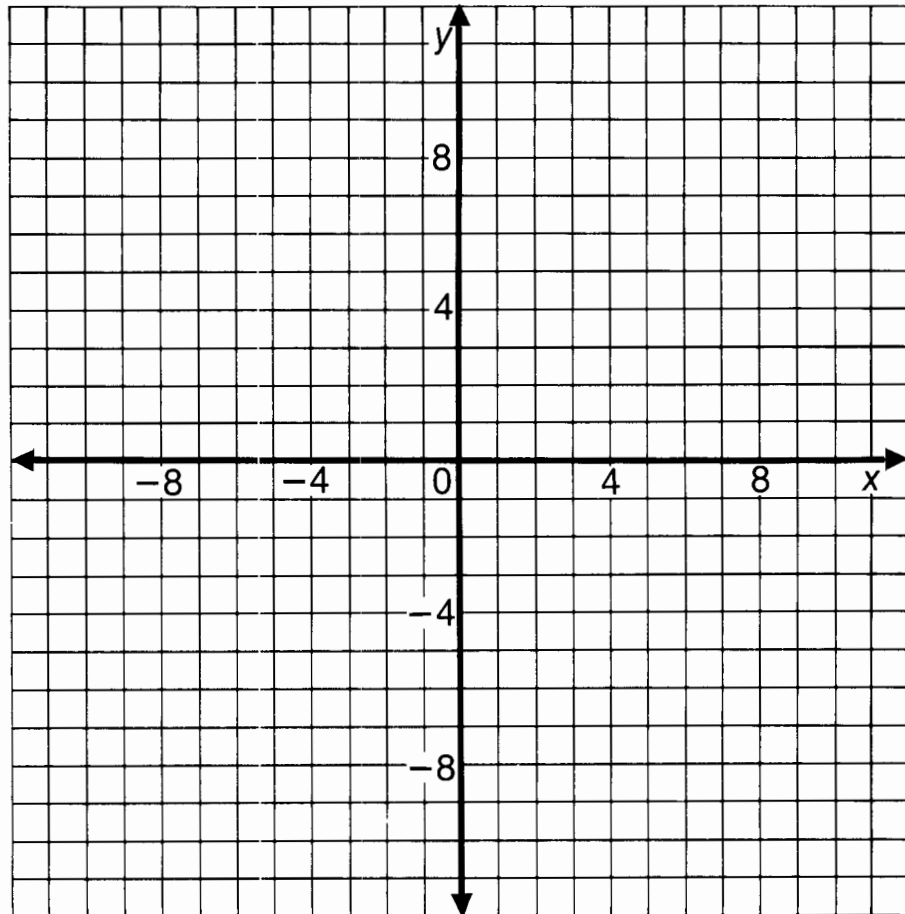
① $y = \frac{20}{x}$

x	y
1	
2	
4	
5	
10	
20	



② $y = \frac{12}{x}$

x	y
1	
2	
3	
4	
6	
12	
-1	
-2	
-3	
-4	
-6	
-12	



How Did Everybody Find Out About the New Corduroy Pillow Covers ?

Solve each problem below. Find your answer in the answer column and notice the letters next to it. Write these letters in the boxes at the bottom of the page that contain the number of that exercise.

- ① For rectangles with the same area, the length varies inversely as the width. One rectangle has a length of 12 cm and a width of 5 cm. Find the length of another rectangle with the same area whose width is 4 cm.

_____ cm

- ② The current in an electrical circuit varies inversely as the amount of resistance in the circuit. The current is 10 amps when the resistance is 24 ohms. Find the current when the resistance is 30 ohms.

_____ amps

- ③ The cost per person to rent a mountain cabin is inversely proportional to the number of people who share the rent. If the cost is \$36 per person when 5 people share, what is the cost per person when 8 people share?

\$ _____

- ④ The volume of a gas varies inversely as the pressure. A helium-filled balloon has a volume of 21 m³ at sea level, where the pressure is 1 atmosphere. The balloon rises to an altitude where the pressure is 0.7 atmospheres. What is its volume?

_____ m³

- ⑤ The number of chairs on a ski lift is inversely proportional to the distance between them. A lift has 70 chairs when they are spaced 24 m apart. If 80 evenly-spaced chairs are used on the lift, how much space will be left between them?

_____ m

- ⑥ For piano wires under the same tension, the number of vibrations per second (frequency) of each wire is inversely proportional to the length of the wire. A wire 0.75 m long vibrates 480 times per second. How long is a wire that vibrates 300 times per second?

_____ m

- ⑦ The time it takes to fly from Los Angeles to New York varies inversely as the speed of the plane. If the trip takes 6 h at 900 km/h, how long would it take at 800 km/h?

_____ h



DEH	1.2
EWS	36
MA	15
RTU	7.2
TH	22.50
EY	21
RKS	1.35
EA	8
DLI	6.75
IS	19
NES	30
IT	24.50

3	3	5	5	1	1	6	6	6	2	2	7	7	7	4	4	4
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KNOTTY

RIDDLE

The old, old rope was tied,
Tied hanging from a ring.
What did its old knot say
When a hippo asked to swing?

TO ANSWER THE RIDDLE ABOVE:

For each exercise, write an equation expressing direct or inverse variation as a square. Use k as the constant of variation. Then solve the two problems under the exercise. Find each answer at the bottom of the page and write the problem letter above it.

4. The brightness of illumination, I , of an object varies inversely as the square of its distance, d , from the source of illumination. If $I = 18$ luxes when $d = 4$ m,

- (I) Find the value of k . _____
 (K) Find I when $d = 3$ m. _____ luxes

1. The distance, d , that a free-falling body falls varies directly as the square of the time, t , that it falls. If $d = 36$ m when $t = 3$ sec,

- (D) Find the value of k . _____
 (A) Find d when $t = 5$ sec. _____ m

2. The amount of material, M , needed to cover a ball is directly proportional to the square of the radius, r . If $M = 60$ cm² when $r = 2$ cm,

- (T) Find the value of k . _____
 (E) Find M when $r = 7$ cm. _____ cm²

3. The price, p , of a pizza varies directly as the square of its radius, r . If $p = \$6.00$ when $r = 10$ cm,

- (A) Find the value of k . _____
 (O) Find p when $r = 15$ cm. \$ _____

5. The time, t , needed to fill the gas tank of a car varies inversely as the square of the diameter, d , of the hose. If $t = 5$ min when $d = 3$ cm,

- (M) Find the value of k . _____
 (F) Find t when $d = 2$ cm. _____ min

6. The electrical resistance, R , of a wire of a certain length is inversely proportional to the square of its diameter, d . If $R = 10$ ohms when $d = 0.6$ mm,

- (N) Find the value of k . _____
 (A) Find R when $d = 3$ mm. _____ ohms

7. The price, p , of a diamond is directly proportional to the square of its weight, w . If $p = \$2000$ when $w = 1$ carat,

- (Y) Find the value of k . _____
 (R) Find p when $w = 0.7$ carat. \$ _____

288	12.75	0.4	45	0.12	100	920	11.25	980	0.06	2000	735	4	2.5	32	3.6	13.50	15
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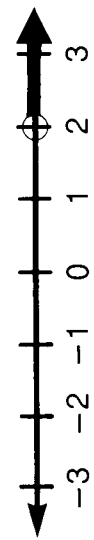
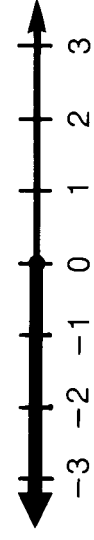
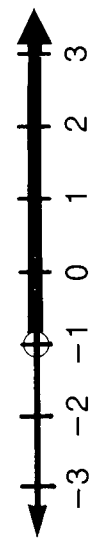


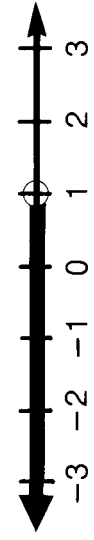
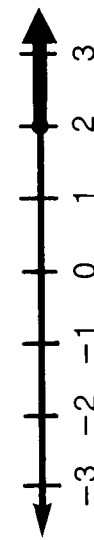



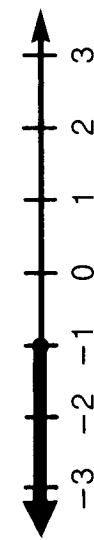
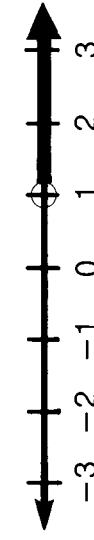
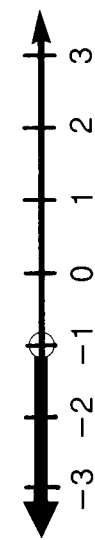

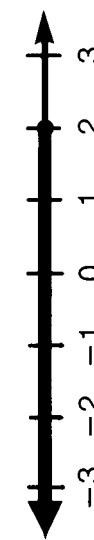

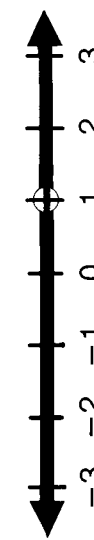
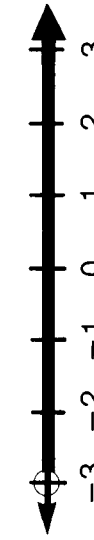
Translate each statement into a formula. Use k as the constant of variation.

- ① V varies jointly as B and h . _____
- ② t varies directly as W and inversely as n . _____
- ③ P varies directly as the square of V and inversely as R . _____
- ④ h varies directly as W and inversely as the square of r . _____
- ⑤ E varies jointly as m and the square of v . _____
- ⑥ I varies jointly as A and H and inversely as T . _____
- ⑦ The mass, m , of a cement block varies jointly as the length, ℓ , width, w , and thickness, t , of the block. _____
- ⑧ The volume, V , of a gas varies directly as the temperature, T , and inversely as the pressure, P . _____
- ⑨ The collision impact, I , of an automobile varies jointly as the mass, m , and the square of the speed, s . _____
- ⑩ The intensity of a sound, i , varies directly as the amplitude, A , of the sound source, and inversely as the square of the distance, d , from the source. _____
- ⑪ The safe load, s , for a beam, varies jointly as the breadth, b , and the square of the depth, d , and inversely as the length, ℓ , between supports. _____
- ⑫ The gravitational force, g , between two objects varies jointly as the mass of the first, m_1 , and the mass of the second, m_2 , and inversely as the square of the distance, d , between them. _____



What Happened When the Crossword Puzzle Champion Died?

Find the graph of the solution set of each inequality below in the corresponding column of graphs. Notice the letter next to it. Write this letter in each box containing the number of that exercise. Keep working and you will find out about this grave event.

① $x < 2$		⑩ $x < 1$	
② $x \leq 2$		⑪ $1 < x$	
③ $x > 2$		⑫ $-3 \leq x$	
④ $x \geq 2$		⑬ $x > -3$	
⑤ $x \neq 1$		⑭ $x \neq -1$	
⑥ $x < -1$		⑮ $0 \geq x$	
⑦ $x > -1$		⑯ $0 \leq x$	
⑧ $x \leq -1$		⑰ $0 > x$	
⑨ $x \geq -1$		⑱ $0 < x$	

1	8	6	11	16	5	14	15	6	17	8	15	10	18	15	7	17	3	2	13	4	13	17	6	15	9	8	1	4	12	14	3	18	18
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What Do You Call Drilling 4,876 Holes?

Solve each inequality. Find the inequality that describes the solution set and cross out the box containing it. After completing all the exercises, print the letters from the remaining boxes in the spaces at the bottom of the page.

① $3x - 8 > 10$

② $-2x + 7 \leq 37$

③ $30 - 8x < 6$

④ $-28 \geq 12x - 4$

⑤ $\frac{x}{4} < 11$

⑥ $\frac{x}{5} - 9 > 3$

⑦ $-\frac{x}{2} + 20 \leq 4$

⑧ $7 - \frac{x}{10} \geq 12$

⑨ $-18 > \frac{x}{6} - 10$

⑩ $\frac{2}{3}x < 14$

⑪ $\frac{2}{5}x - 5 \geq 3$

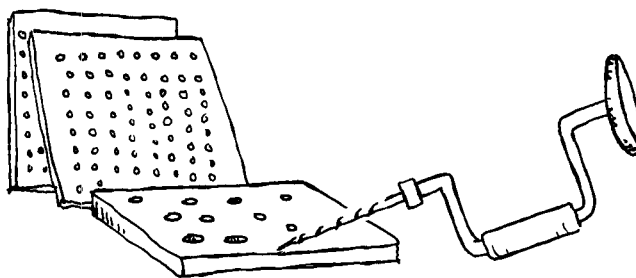
⑫ $-\frac{3}{2}x + 9 \leq 24$

⑬ $-12 \geq 8 - \frac{4}{3}x$

⑭ $\frac{3}{10}x + 21 < 0$

⑮ $30 - 6x \leq 0$

⑯ $13 - \frac{3}{4}x > 13$



HO $x < -70$	DR $x < 44$	AD $x \leq -50$	IL $x > 6$	AB $x < -1$	LE $x \geq -10$	AD $x < 0$
IG $x < -48$	OR $x \geq 31$	BI $x > 3$	SP $x \geq 5$	TH $x > 60$	IN $x > 9$	TO $x \geq 20$
HO $x \geq 32$	GJ $x \leq -4$	LE $x \geq -15$	SL $x \geq 15$	OB $x < 19$	OW $x < 21$	LE $x \leq -2$

Why Was Professor Clabberhead Utterbunk Holding Up a Piece of Bread ?

Solve each inequality below. In the answer column, find the inequality that describes the solution set and notice the letter next to it. Print this letter in each box at the bottom of the page that contains the number of that exercise.



① $5x + 2 > 3x + 10$

② $8 + 2x \leq 6x - 20$

③ $4x + 49 < 9 - x$

④ $9x - 99 \geq 18x$

⑤ $3(x - 4) > 15$

⑥ $28 < 4(5 - 2x)$

⑦ $3(2n + 1) \geq 4n + 9$

⑧ $3n - 10 \leq 7(2 + n)$

⑨ $-4(2n - 6) < n + 6$

⑩ $2(7n - 1) \geq 3(5 - n)$

⑪ $7n - 2(n + 5) < 3n - 16$

⑫ $4(1 - 3n) - 14 > 4(2n + 3) - 9n$

Ⓛ $n \geq 5$

ⓖ $n \geq -6$

Ⓐ $x < -8$

Ⓞ $n < -3$

Ⓡ $x > 4$

Ⓢ $x < -1$

Ⓤ $x < 10$

⓲ $x \leq -11$

Ⓟ $n \geq 1$

Ⓝ $x \geq 7$

Ⓣ $n < -2$

ⓔ $n \geq 3$

Ⓦ $n > 2$

Ⓜ $n < -5$

ⓗ $x > 9$

5	7	9	3	6	10	1	11	10	11	6	4	2	8	3	12	11	3	6	12
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Who Discovered the World's Smallest Glacier?

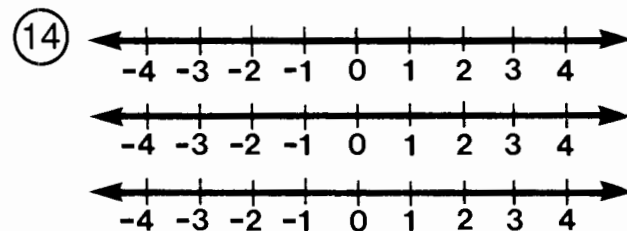
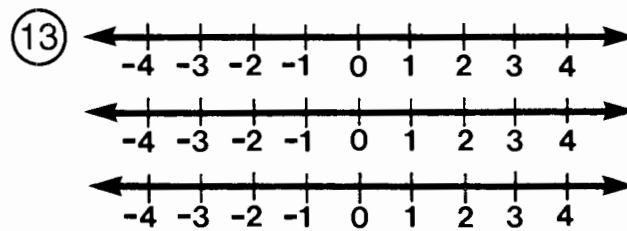
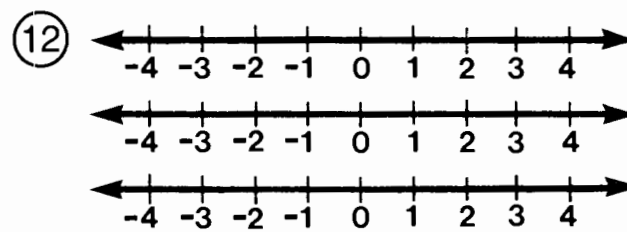
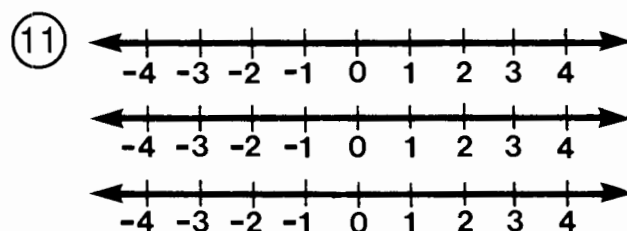
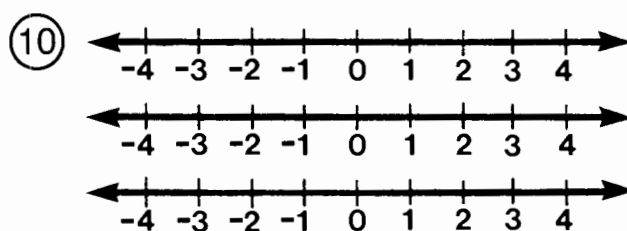
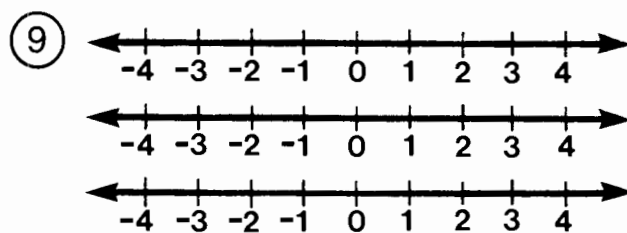
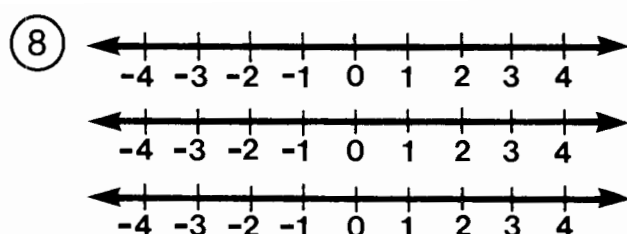
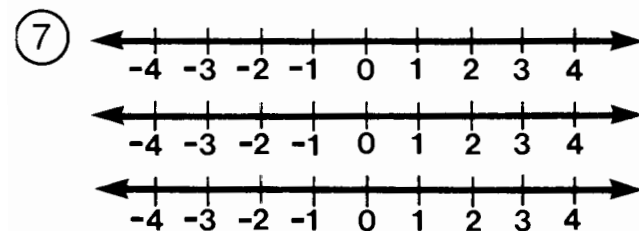
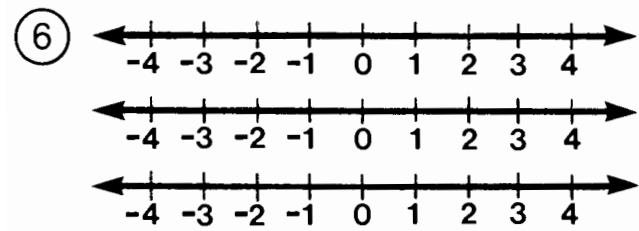
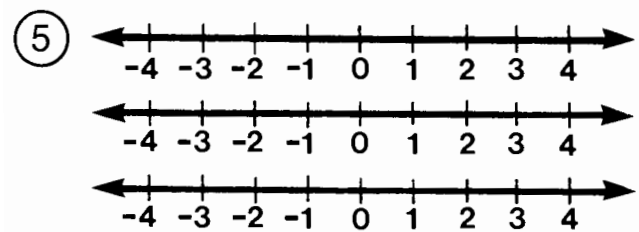
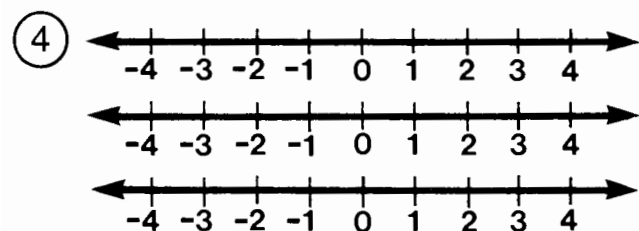
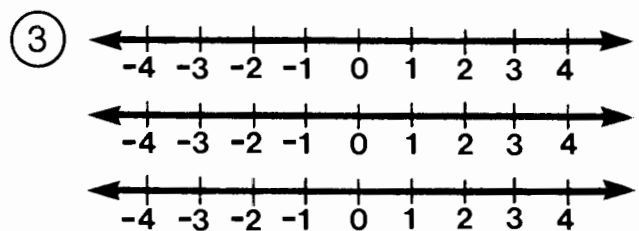
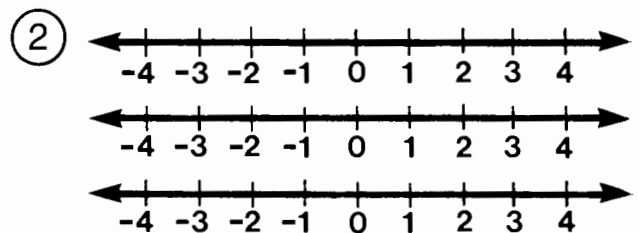
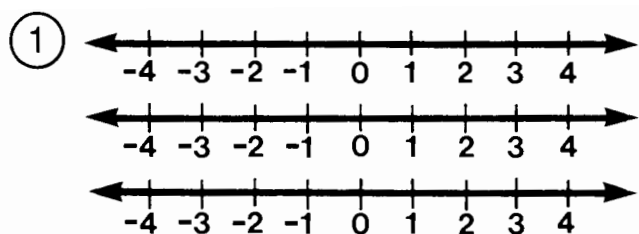
Use the table below to specify each union or intersection. Then find the corresponding graph in the column of graphs. Write the letter of the graph in each box that contains the number of the exercise.

$A = \{x \mid x > -3\}$
 $B = \{x \mid x < 2\}$
 $C = \{x \mid x \geq 0\}$
 $D = \{x \mid x \leq -1\}$
 $E = \{x \mid x \leq 4\}$
 $F = \{x \mid x > 2\}$
 $G = \{x \mid x < 0\}$

- ① $A \cap C$
- ② $A \cup C$
- ③ $B \cap D$
- ④ $B \cup D$
- ⑤ $A \cap B$
- ⑥ $A \cup B$
- ⑦ $E \cap G$
- ⑧ $E \cup G$
- ⑨ $C \cap D$
- ⑩ $C \cup D$
- ⑪ $B \cap C$
- ⑫ $D \cup F$
- ⑬ $A \cap F$
- ⑭ $B \cup F$

(D)	
(O)	
(H)	
(S)	
(T)	
(E)	
(I)	
(A)	
(P)	
(G)	
(R)	
(N)	
(C)	
(W)	ϕ

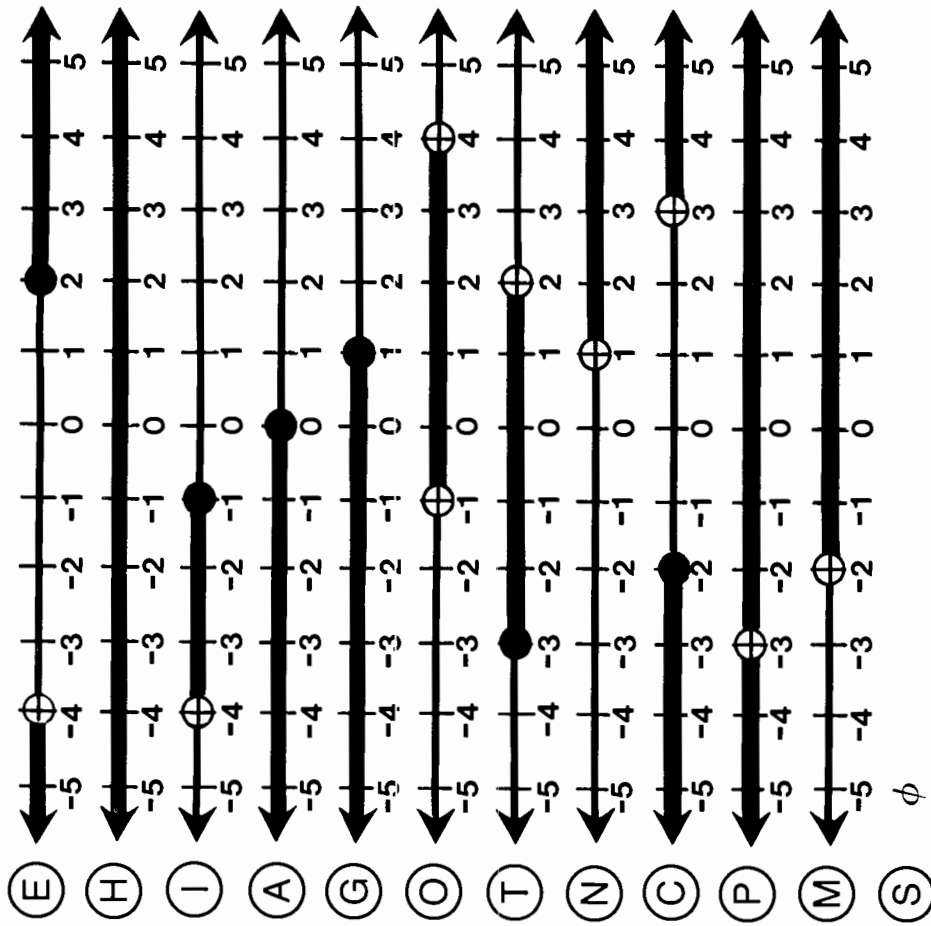
5	10	3	2	13	11	7	9	14	8	1	6	11	11	4	14	12	3	13	14	6	1	8
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What Happened to the Glass Blower Who Inhaled?

Find the solution set of each combined inequality below. Then find the corresponding graph in the column of graphs. Write the letter of the graph in each box that contains the number of that exercise.

- 1 $x > -4$ and $x \leq -1$
- 2 $x + 5 > 4$ and $x - 2 < 2$
- 3 $y \leq -2$ or $y > 3$
- 4 $-3t > 12$ or $5t \geq 10$
- 5 $2n + 5 > 1$ and $3n + 4 > 7$
- 6 $-4u + 9 > 1$ and $7u - 13 \leq -6$
- 7 $32 \leq 3x + 20$ or $17 > 1 - 8x$
- 8 $-2k + 8 < 14$ or $3k + 1 < 1$
- 9 $5(w + 4) \geq 5$ and $2(w + 4) < 12$
- 10 $3(6 - y) \leq 6$ and $6 - y \geq 8$
- 11 $3x < 2x - 3$ or $7x > 4x - 9$
- 12 $\frac{x}{2} \leq -2$ or $-\frac{x}{2} \geq 0$

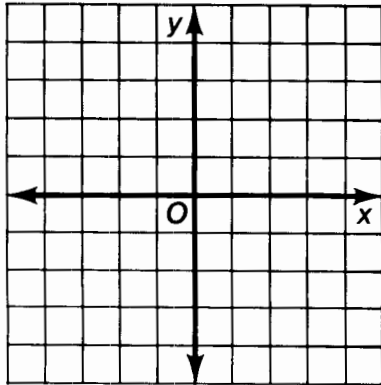


8	4	6	2	9	12	11	12	5	4	1	5	8	1	10	10	9	2	7	12	3	8
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What Is the Proper Thing to Say When You Introduce a Hamburger?

Graph each inequality below. Then read the two statements under the coordinate grid for that exercise. Circle the letter of the statement that correctly describes the location of the graph. Print this letter in each box at the bottom of the page that contains the exercise number.

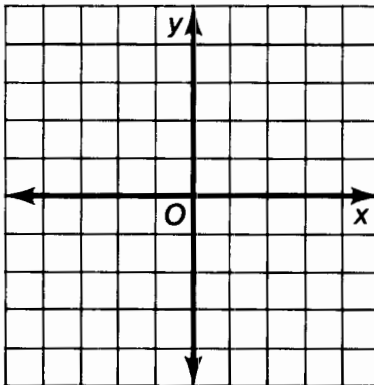
① $y \leq x + 2$



A All four quadrants;
includes boundary line.

I Quadrants I, II, IV;
includes boundary line.

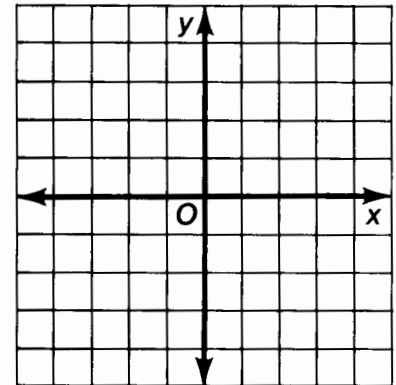
② $y < \frac{2}{3}x - 1$



N Quadrants I, II, IV;
excludes boundary line.

Y Quadrants I, III, IV;
excludes boundary line.

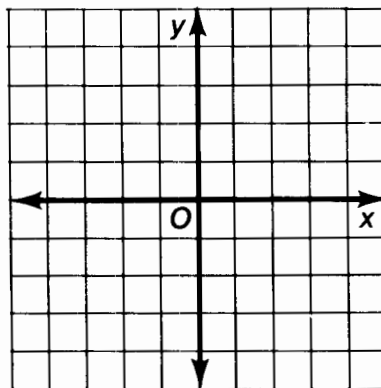
③ $y \geq -2x - 3$



R Quadrants I, III, IV;
includes boundary line.

P All four quadrants;
includes boundary line.

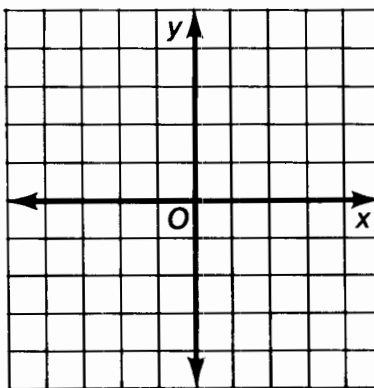
④ $y > -\frac{1}{2}x + 1$



O Quadrants I, II, IV;
includes boundary line.

E Quadrants I, II, IV;
excludes boundary line.

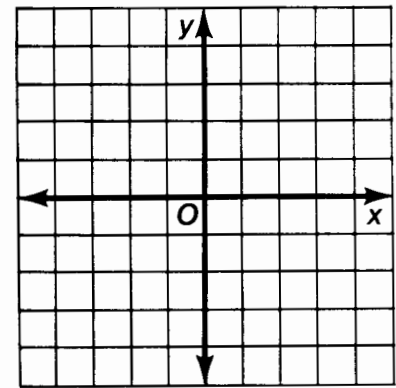
⑤ $y < \frac{5}{4}x - 2$



M Quadrants I, III, IV;
excludes boundary line.

S Quadrants I, II, IV;
excludes boundary line.

⑥ $y \geq -x + 3$



L All four quadrants;
includes boundary line.

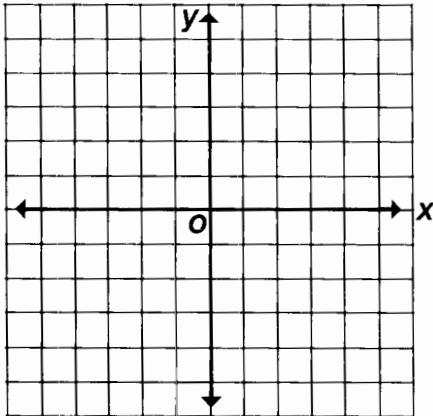
T Quadrants I, II, IV;
includes boundary line.

	5	4	4	6	3	1	6	6	2
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Why Did the Three Pigs Leave Home?

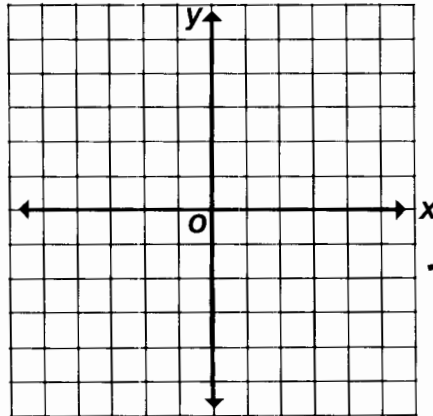
Graph each inequality below. Circle the letter of the statement that correctly describes the location of the graph. Print this letter in each box at the bottom of page 31 that contains the number of the exercise.

① $y \geq \frac{1}{2}x - 3$



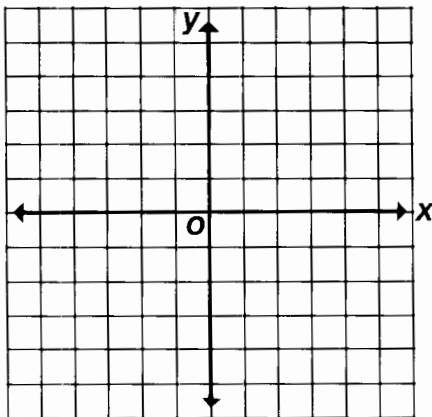
- D Quadrants I, II, IV; includes boundary line.
- E All four quadrants; includes boundary line.
- I Quadrants I, III, IV; excludes boundary line.

② $x + y > 1$



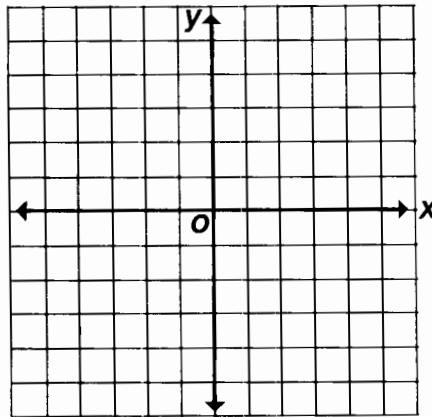
- S Quadrants I, II, IV; excludes boundary line.
- B All four quadrants; includes boundary line.
- F Quadrants I, III, IV; excludes boundary line.

③ $y \leq 2x - 2$



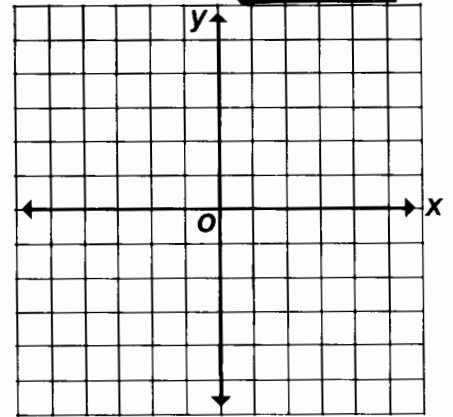
- L Quadrants I, II, IV; includes boundary line.
- T Quadrants I, III, IV; includes boundary line.
- V All four quadrants; excludes boundary line.

④ $3x + 2y < 6$



- C Quadrants II, III, IV; excludes boundary line.
- M Quadrants I, II, IV; includes boundary line.
- O All four quadrants; excludes boundary line.

⑤ $y \geq 2$



- R All four quadrants; excludes boundary line.
- U Quadrants II, III; includes boundary line.
- H Quadrants I, II; includes boundary line.

