In Pre-Algebra, we will use a hand-held scientific calculator as well as the on-line calculator DESMOS. You can access the DESMOS calculator at this link: **https://www.desmos.com/scientific.**

Section 1– Integer Operations

Directions: In this section try to answer without using the calculator, then check your answers on the calculator.

1. $8 - 19$

-11

2. $-7 - 12$

$-7 + -12 = -19$

3. $11 - (-2)$

$11 + 2 = 13$

4. $-4 - (-1)$

$-4 + 1 = -3$

5. $|-5| + 8$

$5 + 8 = 13$

6. $|-9| + (-5)$

$9 + -5 = 4$

7. $4 \cdot (-7)$

-28

8. $-5 \cdot (-3)$

15

9. $\dfrac{-8}{-4}$

$-8 \div -4 = 2$

Section 2– Fraction Computation

Directions: Simplify each expression. Reduce all answers to their simplest form.

1. $\dfrac{2}{5} + \dfrac{1}{8}$

$\dfrac{16}{40} + \dfrac{5}{40} = \dfrac{21}{40}$

2. $\dfrac{9}{10} - \dfrac{3}{4}$

$\dfrac{18}{20} - \dfrac{15}{20} = \dfrac{3}{20}$

3. $\dfrac{\cancel{8}^{1}}{\cancel{9}_{3}} \cdot \dfrac{\cancel{8}^{1}}{\cancel{8}_{1}} = \dfrac{1}{3}$

4. $\dfrac{5}{7} \div \dfrac{3}{14}$

$\dfrac{5}{\cancel{7}_{1}} \cdot \dfrac{\cancel{14}^{2}}{3} = \dfrac{10}{3}$

5. $2\dfrac{1}{3} \cdot \dfrac{2}{7}$

$\dfrac{\cancel{7}^{1}}{3} \cdot \dfrac{2}{\cancel{7}_{1}} = \dfrac{2}{3}$

6. $\dfrac{3}{4} \div \dfrac{7}{6} \cdot \dfrac{4}{9}$

$\dfrac{\cancel{3}^{1}}{\cancel{4}_{1}} \cdot \dfrac{\cancel{6}^{2}}{7} \cdot \dfrac{\cancel{4}^{1}}{\cancel{9}_{3}} = \dfrac{2}{7}$

Section 3– Compare and Order Rational Numbers

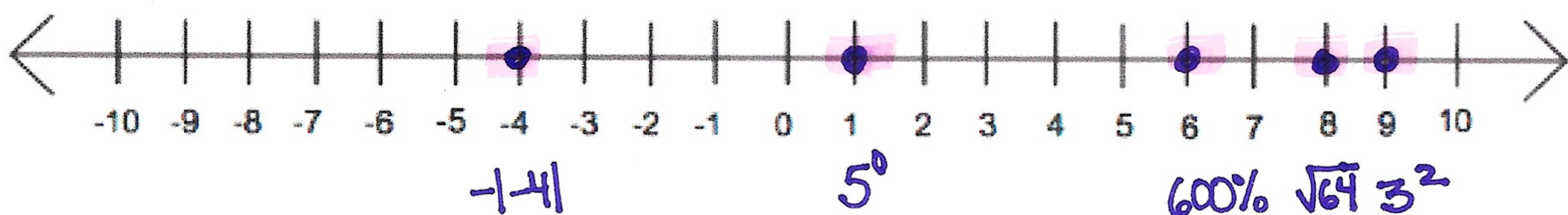1. Plot each of the following values on the number line provided.

$\sqrt{64} = 8$ $3^2 = 9$ $-|-4| = -4$ $600\% = 6$ $5^0 = 1$

$-|-4|$ 5^0 $600\% \quad \sqrt{64} \quad 3^2$

2. Order the rational numbers from least to greatest. (Convert to decimals first!)

Numbers:	$\sqrt{25}$ 5	250% 2.5	$\dfrac{-15}{4}$ -3.75	3
Least to Greatest:	$\dfrac{-15}{4}$ -3.75	250% 2.5	3	$\sqrt{25}$ 5

Least   Greatest

Section 4 – Order of Operations

Remember that the order of operations is

- ✓ Grouping
- ✓ Exponents
- ✓ Multiply or Divide (whichever comes first as you read left to right)
- ✓ Add or Subtract (whichever comes first as you read left to right)

Directions: Simplify each expression

In this section, try to answer without using a calculator, then check your answer on the calculator.

1. $9 + 3^2 - 8 \cdot 2$

$9 + 9 - 8 \cdot 2$
$9 + 9 - 16$
$18 - 16 = 2$

2. $\dfrac{4 + 10 \cdot (-2)}{2^3}$

$\dfrac{4 + (-20)}{8} = \dfrac{-16}{8} = -2$

3. If a = 4, b = −2, c = 9 what is the value of $bc + \sqrt{4a}$?

$(-2)(9) + \sqrt{4(4)}$
$-18 + \sqrt{16}$
$-18 + 4 = -14$

4. If x = −2 and y = 3, what is the value of $10y + 2|3x+2|$?

$10(3) + 2|3(-2)+2|$
$10(3) + 2|-6+2|$
$10(3) + 2|-4|$
$10(3) + 2(4)$
$30 + 8 = 38$

Section 5 – Percent Computation

$$\dfrac{is}{of} = \dfrac{\%}{100}$$

1. What is 5% of 90?

equation: $.05 \cdot 90 = 4.5$

proportion: $\dfrac{x}{90} = \dfrac{5}{100}$ $100x = 5(90)$
$100x = 450$
$x = 4.5$

2. What is 20% of 800?

eq. $.20 \cdot 800 = 160$

prop. $\dfrac{x}{800} = \dfrac{20}{100}$ $100x = 20(800)$
$100x = 16000$
$x = 160$

3. 6 is what percent of 60?

eq. $6 = x\% \cdot 60$ $\dfrac{6}{60} = x\% = .1 = 10\%$

prop. $\dfrac{6}{60} = \dfrac{x}{100} =$ $60x = 6(100)$
$60x = 600$
$x = 10\%$

4. 20 is 15% of what number?

eq. $20 = .15(x)$
$\dfrac{20}{.15} = x$
$x = 133.\overline{3}$

prop. $\dfrac{20}{x} = \dfrac{15}{100}$
$15x = 20(100)$
$15x = 2000$

Section 6– Equations

Directions: Solve each equation for the variable given. Check your answer through substitution.

1.　$-12 = x + 9$
$-9 -9$
$-21 = x$
$x = -21$
$-12 = -21 + 9$
$-12 = -12 ✓$

2.　$7 - x = 18$
$-7 -7$
$-x = 11$
$x = -11$
$7 - (-11) = 18$
$7 + 11 = 18$
$18 = 18 ✓$

3.　$2x - 4 = -20$
$+4 +4$
$2x = -16$
$x = -8$
$2(-8) - 4 = -20$
$-16 - 4 = -20$
$-20 = -20 ✓$

4.　$\frac{4}{1} \cdot \frac{1}{4}x = 9 \cdot \frac{4}{1}$
$x = 36$
$\frac{1}{4}(36) = 9$
$9 = 9 ✓$

5.　$\frac{1}{3}x + 5 = 14$
$-5 -5$
$\frac{3}{1} \cdot \frac{1}{3}x = 9 \cdot \frac{3}{1}$
$x = 27$
$\frac{1}{3}(27) + 5 = 14$
$9 + 5 = 14$
$14 = 14 ✓$

6.　$3 \cdot \frac{x+7}{3} = 4 \cdot 3$
$x + 7 = 12$
$-7 -7$
$x = 5$
$\frac{5+7}{3} = 4$
$\frac{12}{3} = 4$
$4 = 4 ✓$

Directions: Write the verbal sentence as an algebraic equation.

1.　The product of a three and a number plus five is 20.
$3n + 5 = 20$

2.　Nine less than a number is four.
$n - 9 = 4$

Section 7– Inequalities

Directions: Solve each inequality for the variable given. Check your answer through substitution. Graph your answer on a number line.

1.　$2x - 11 < 13$
$+11 +11$
$\frac{2x}{2} < \frac{24}{2}$
$x < 12$
Choose # < 12
$2(11) - 11 < 13$
$22 - 11 < 13$
$11 < 13 ✓$

11　12　13

2.　$-5x \geq -15$
$\frac{-5}{-5} \frac{-15}{-5}$
$x \leq 3$
$-5(2) \geq -15$
$-10 \geq -15 ✓$

2　3　4
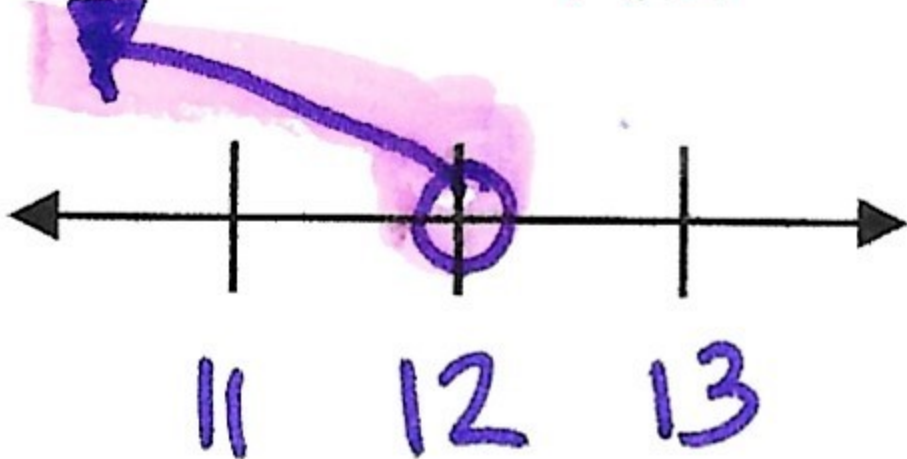
3.　$\frac{1}{6}x - 2 \geq -32$
$+2 +2$
$6 \cdot \frac{1}{6}x \geq -30 \cdot 6$
$x \geq -180$
$\frac{1}{6}(120) - 2 \geq -32$
$-20 - 2 \geq -32$
$-22 \geq -32 ✓$

-181　-180　-179
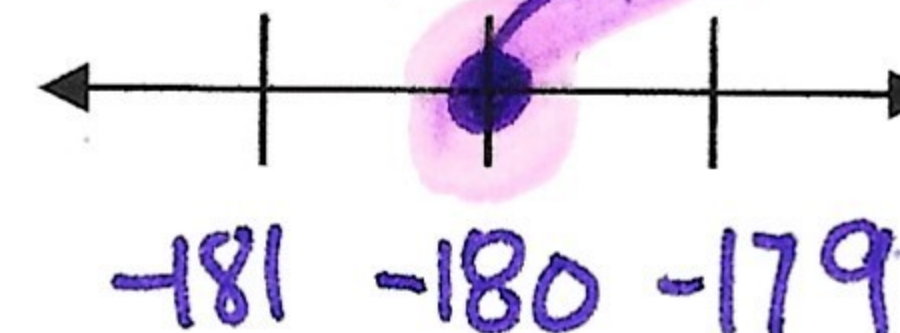
Section 8– Graphing on the coordinate plane

A. (4, 7)

B. (−2, 6)

C. (−5, −3)
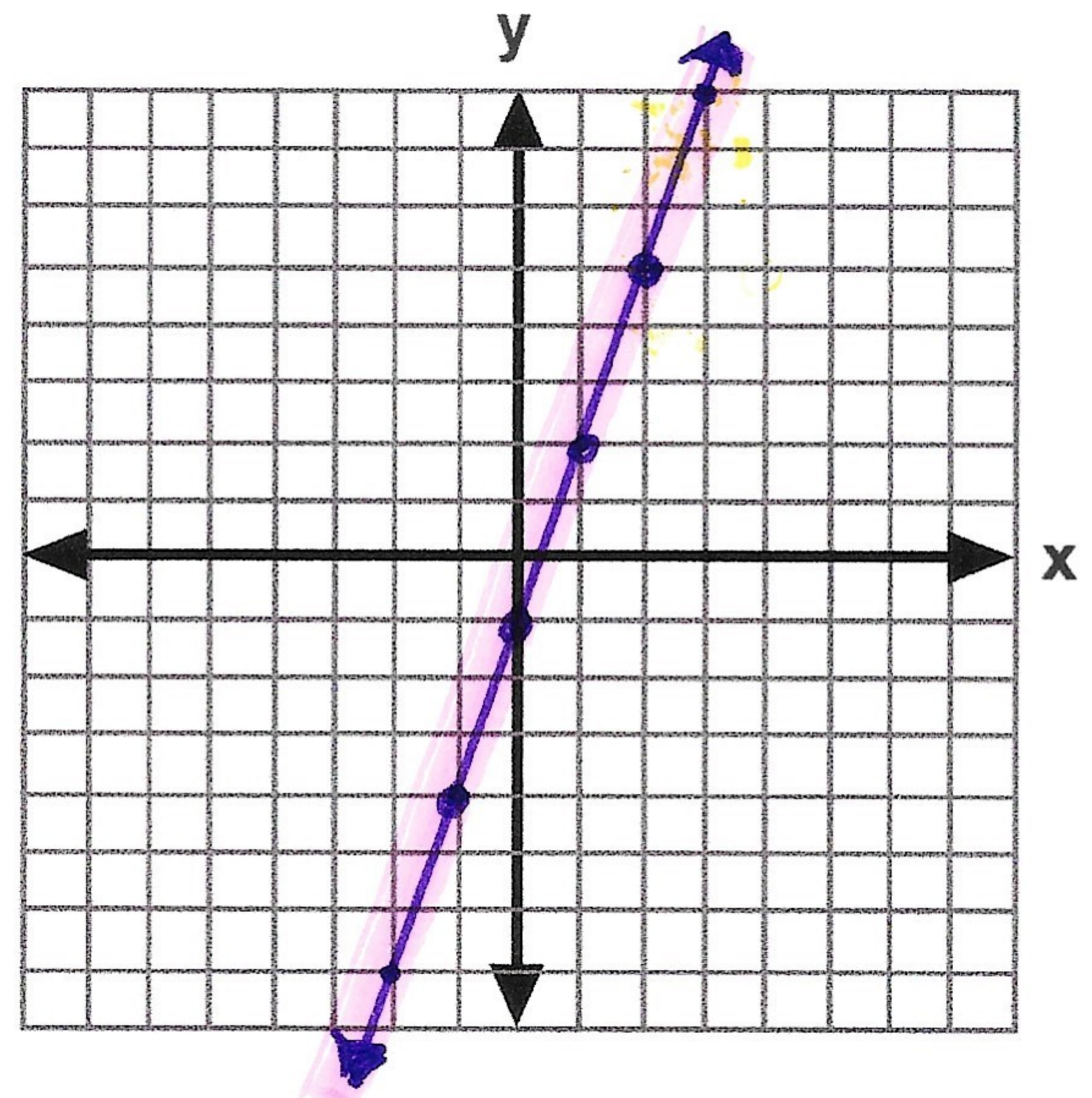
D. (1, −8)

E. (0, 0)

F. (0, 7)

G. (−3, 0)
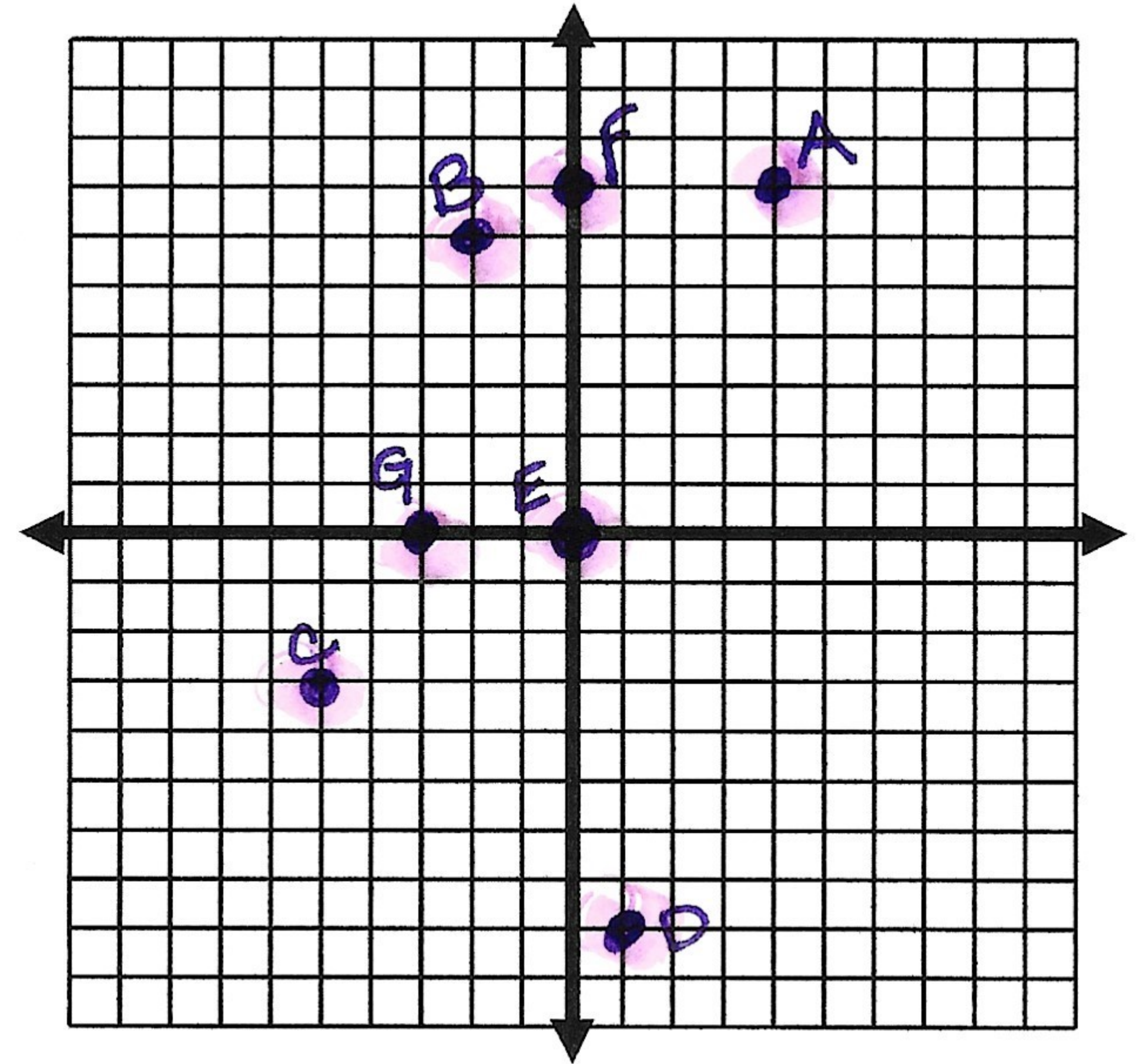
Section 9– Functions

1. Complete the function table based on the rule and then graph the resulting ordered pairs. Connect the ordered pairs to form a line.

Function Rule: $y = 3x - 1$

x	y	
-1	−4	$3(-1)-1$
0	−1	$3(0)-1$
1	2	$3(1)-1$
2	5	$3(2)-1$

2. The table of values represents a relationship between x and y.

a. Determine the y-intercept of the line that passes through the points represented by the values in this table.

y-intercept is value of y when $x = 0$

x	y
0	3
2	5
3	6

$+2$ ⟵ yint = 3 (b)

-1 ⟶ $+2$, $+1$
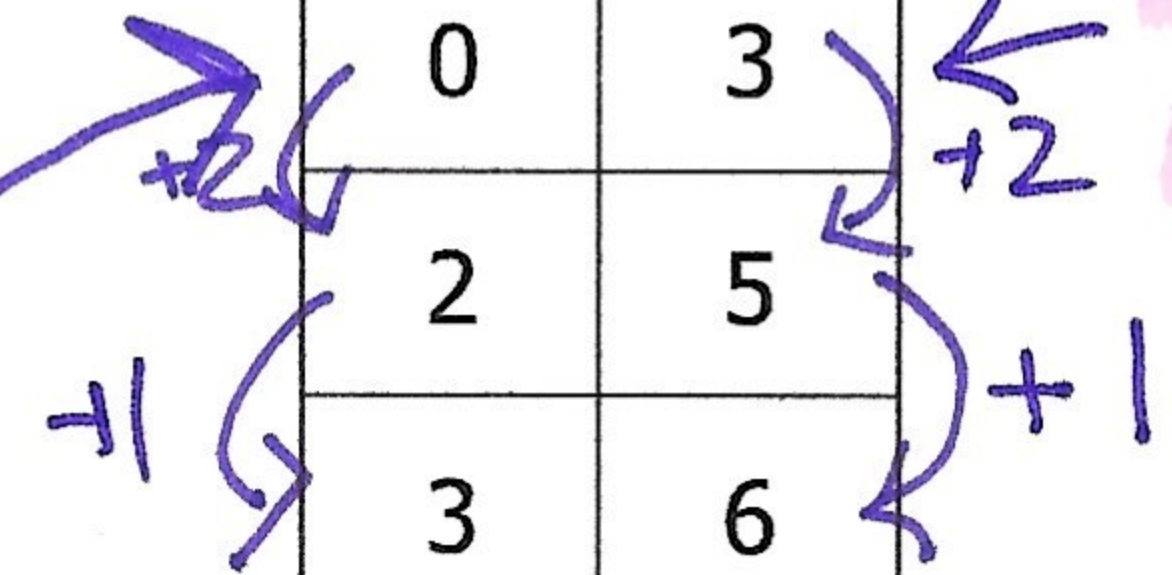
b. Write an equation of the line that contains each point represented by this table of values.

step 1: find slope: $\frac{2}{2}$ or $\frac{1}{1} = 1$

$m = \frac{\Delta y}{\Delta x}$

step 2: $y = mx + b$

$y = 1x + 3$

or

$y = x + 3$

3. Graph the line that passes through (-2, 3) and has a y-intercept of 5. Graph at least two additional points that lie on this line.

(0,5)

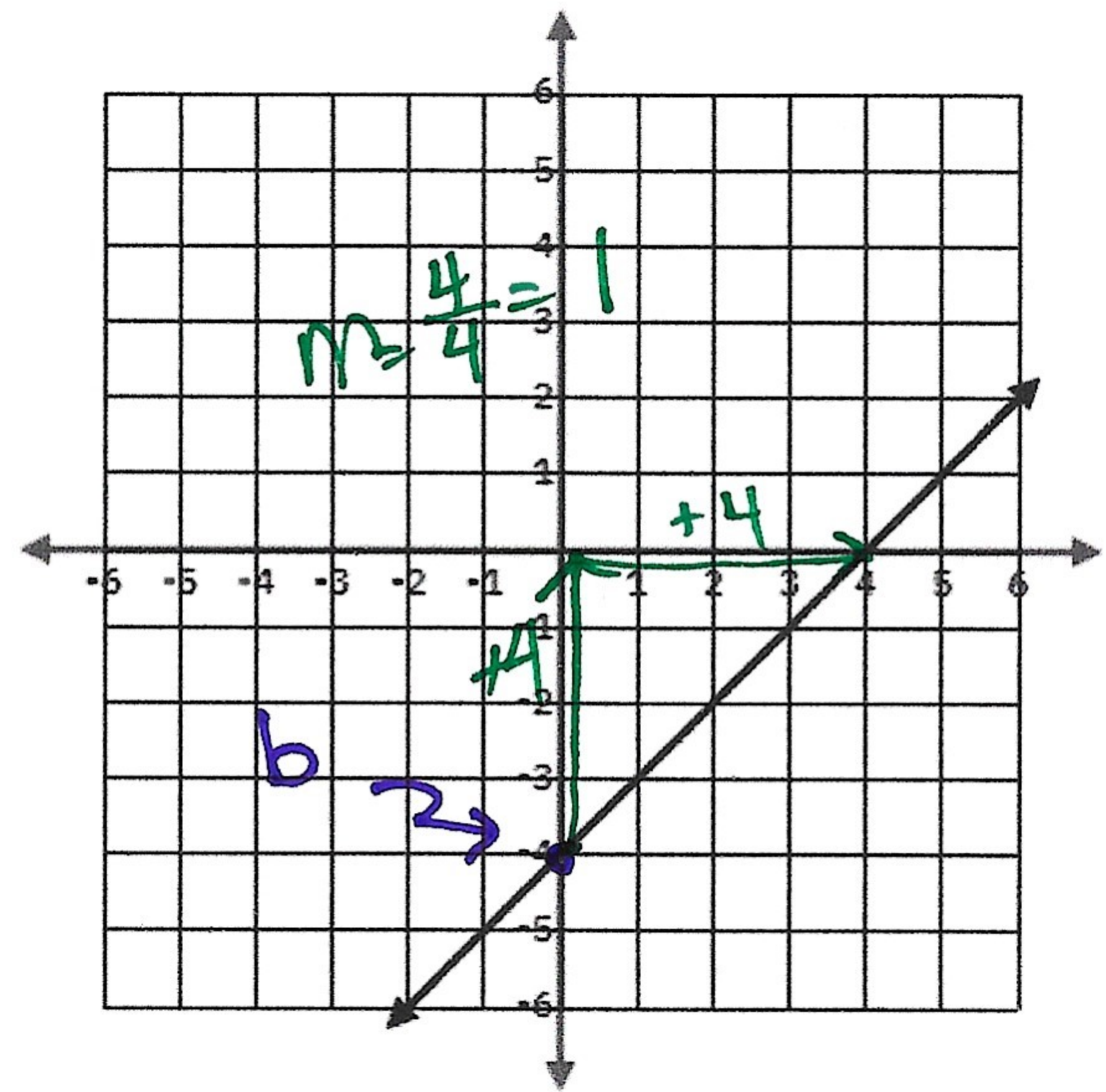$m = \dfrac{\Delta y}{\Delta x}$ $\dfrac{5-3}{0-(-2)} = \dfrac{2}{2} = 1$

$b = 5$

$y = x + 5$
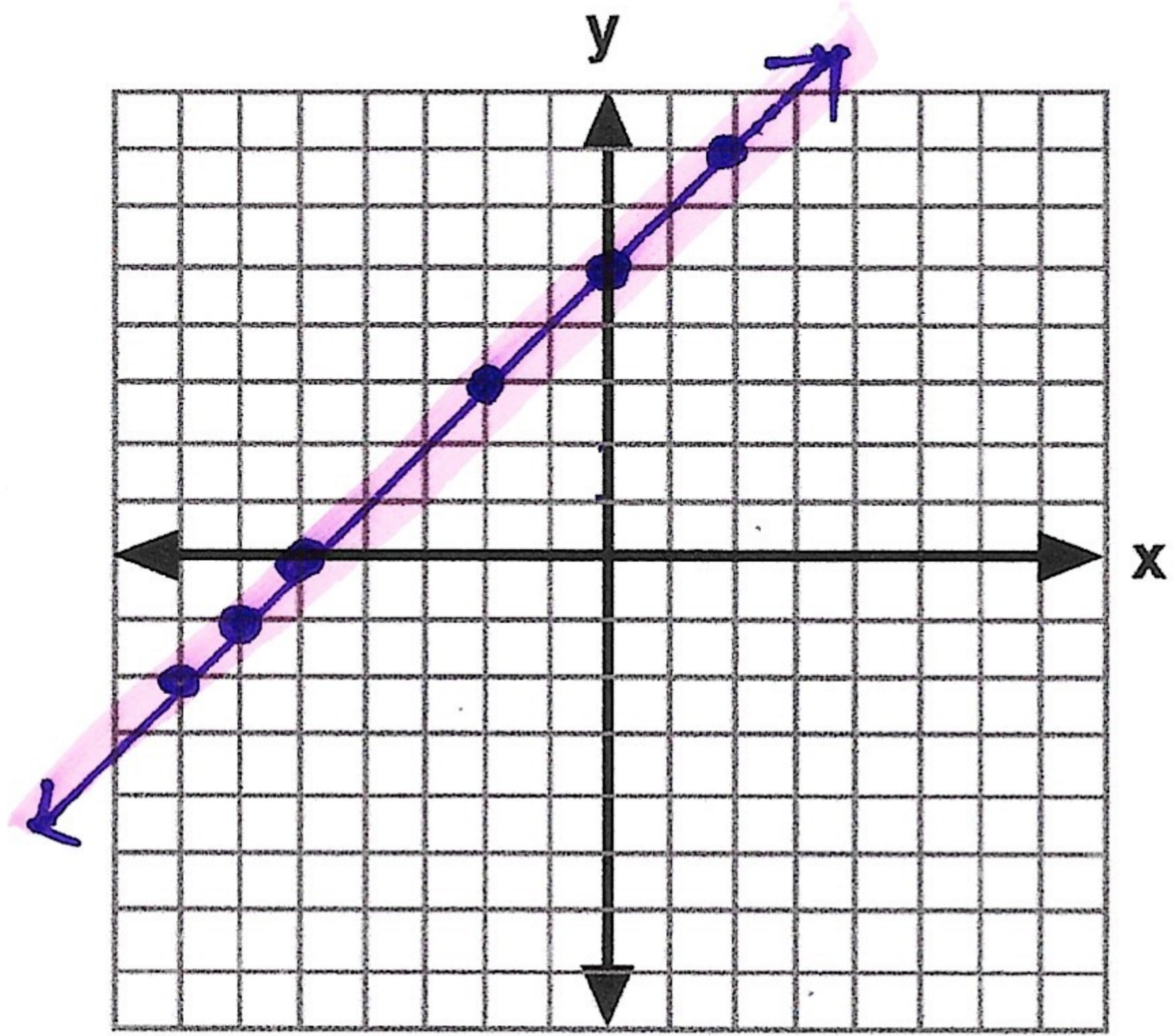
4. Write the equation of the line representing the relationship shown in the graph.
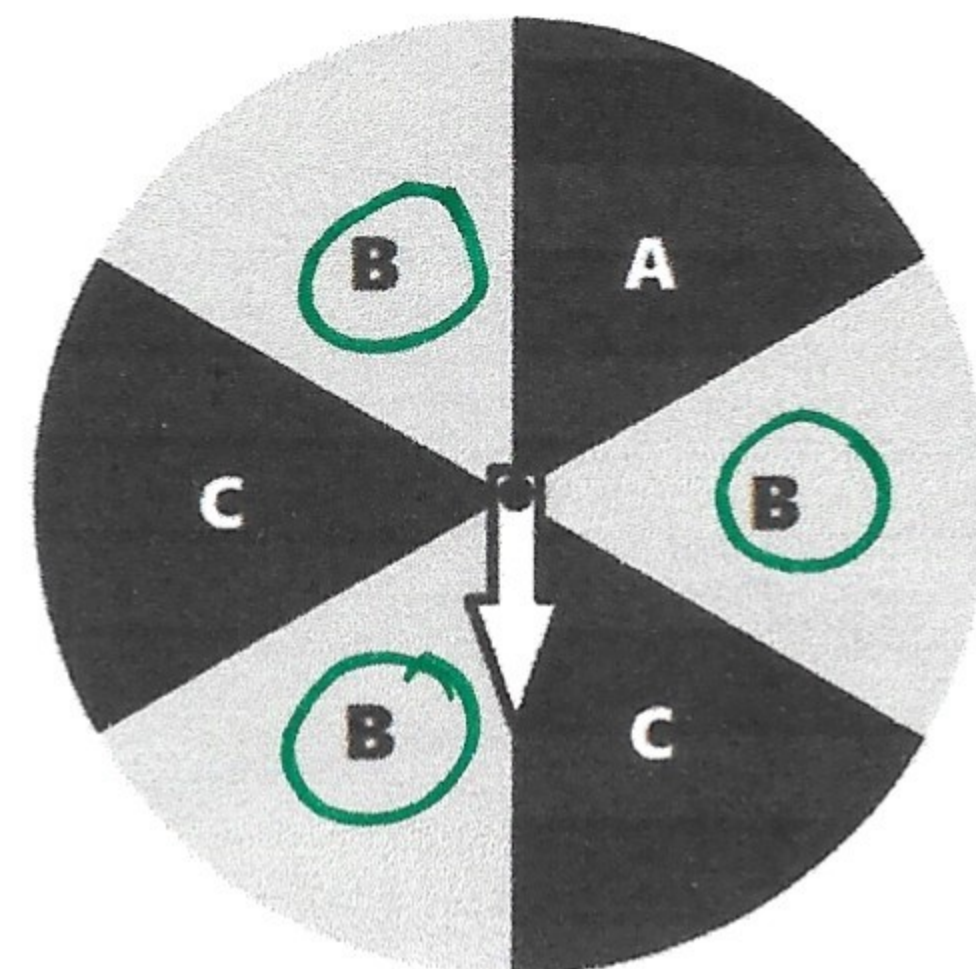
$b = -4$

$m = 1$

$y = 1x - 4$

$y = x - 4$

$m = \dfrac{4}{4} = 1$

$+4$

$b \searrow$

Section 10– Probability

1. The sides of a fair number cube are labeled 1, 2, 3, 4, 5, and 6. What is the theoretical probability that the number cube will land with the number 5 facing up?

$P(5) = \dfrac{1}{6} = .1\overline{6} = 16.7\%$

2. Find the theoretical probability that the spinner below lands on the letter B. Write your answer as a fraction in simplest form.

$P(B) = \dfrac{3}{6} = \dfrac{1}{2}$

Section 11– Geometry

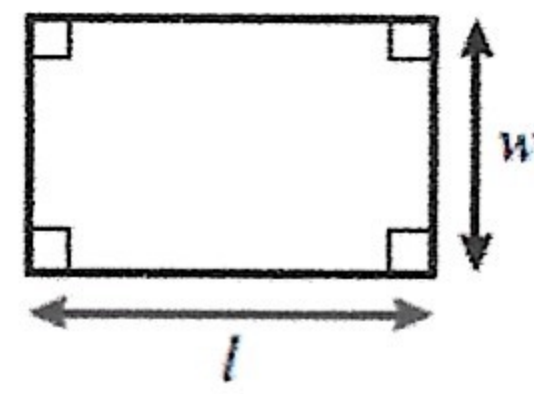Use the VDOE SOL formulas below to answer the following questions.
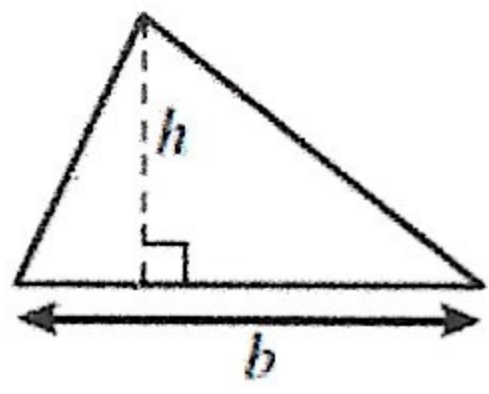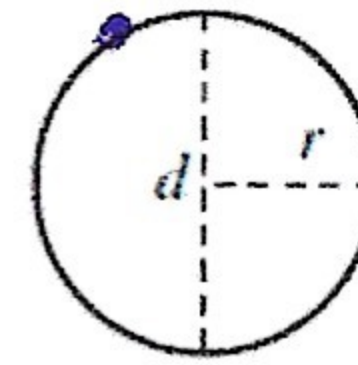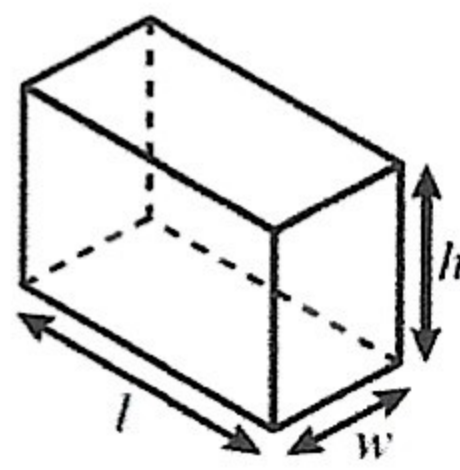

$A = \frac{1}{2}bh$
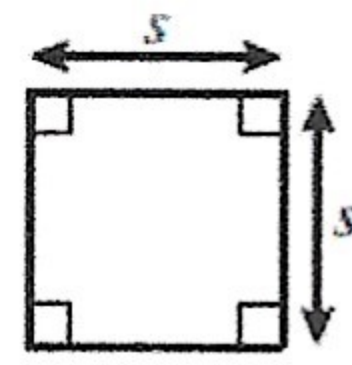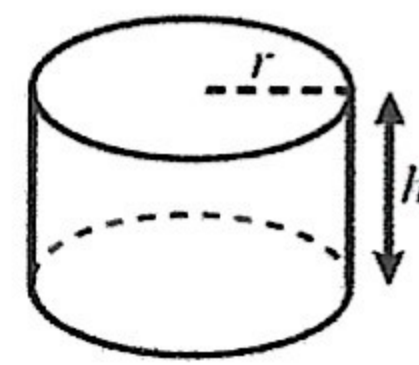
$p = 4s$
$A = s^2$

$p = 2l + 2w$
$A = lw$

$C = 2\pi r$
$C = \pi d$
$A = \pi r^2$

$V = lwh$
$S.A. = 2lw + 2lh + 2wh$

$V = \pi r^2 h$
$S.A. = 2\pi r^2 + 2\pi r h$

Pi

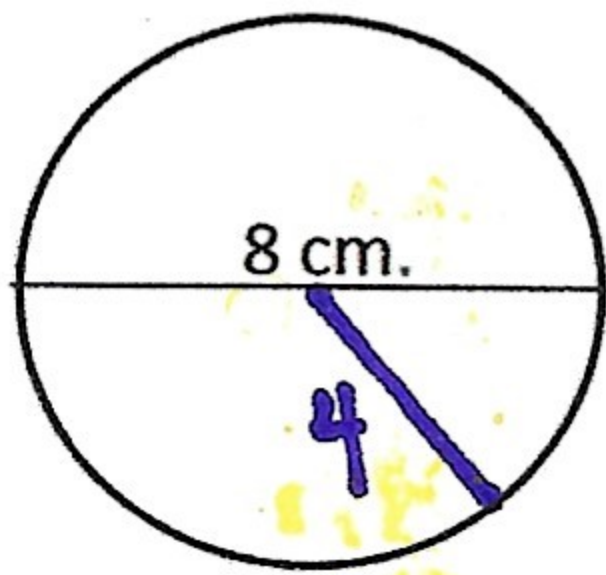$\pi \approx 3.14$

$\pi \approx \frac{22}{7}$

Directions: For figures 1 – 3, calculate the area and the perimeter/circumference.

1.

8 cm.

4

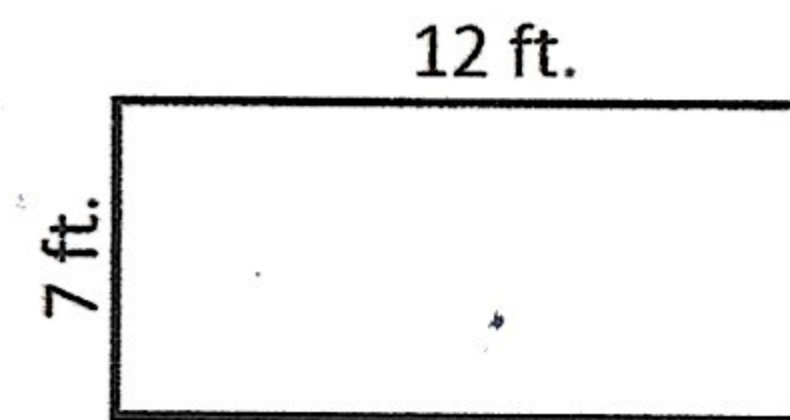$A = \pi r^2$
$A = (3.14)(4)^2$
$A = 3.14(16)$
$A = 50.24 \, cm^2$

$C = \pi \cdot d$
$C = (3.14)(8)$
$C = 25.12 \, cm$

2.

12 ft.

7 ft.

$A = lw$
$A = 7 \cdot 12$
$A = 84 ft^2$

$P = 2(l + w)$
$P = 2(12 + 7)$
$P = 2(19)$
$P = 38 ft$

3.

25 ft.

7 ft.

h →

24 ft.

↑
b
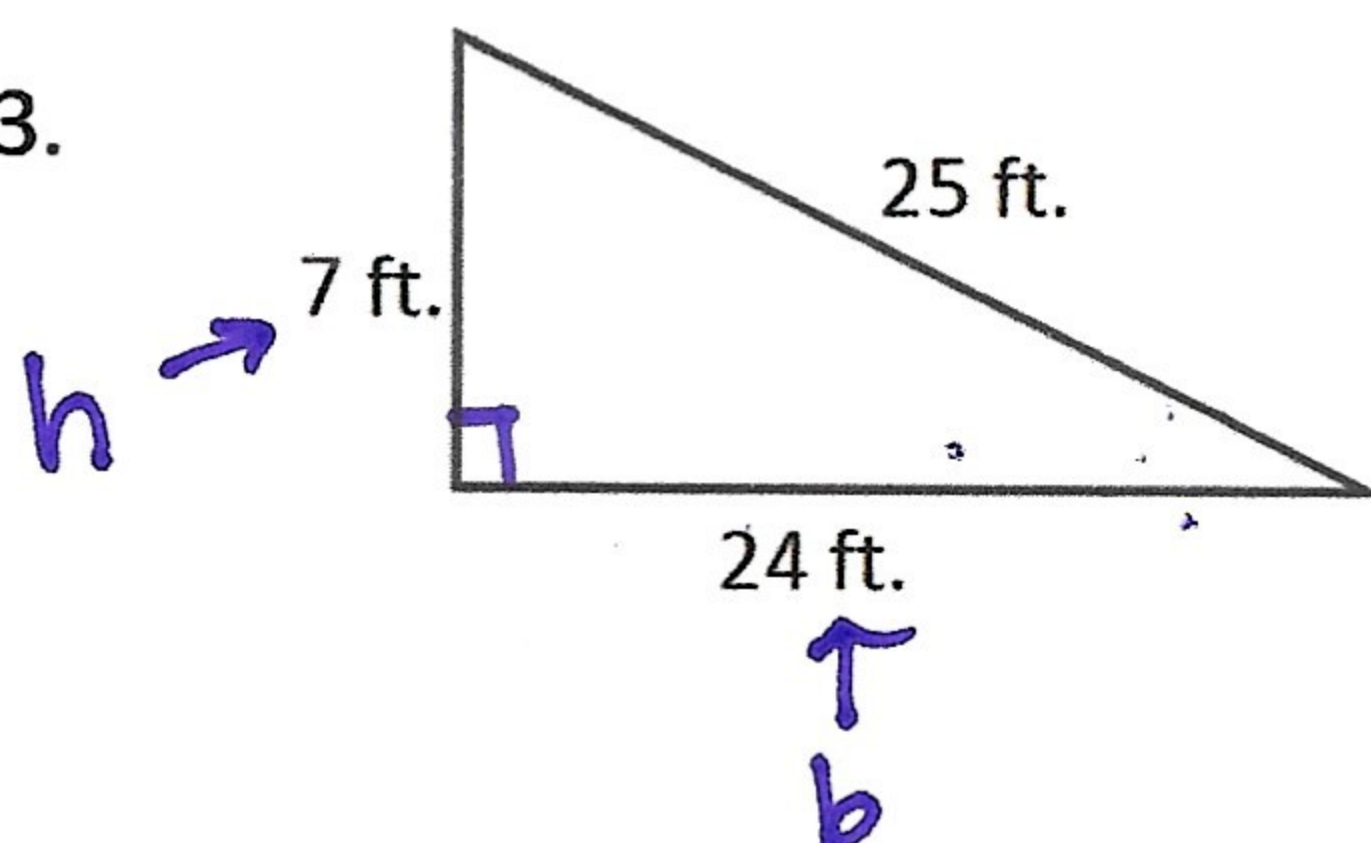
$A = \frac{1}{2}bh$
$A = \frac{1}{2}(24)(7)$
$A = 84 ft^2$
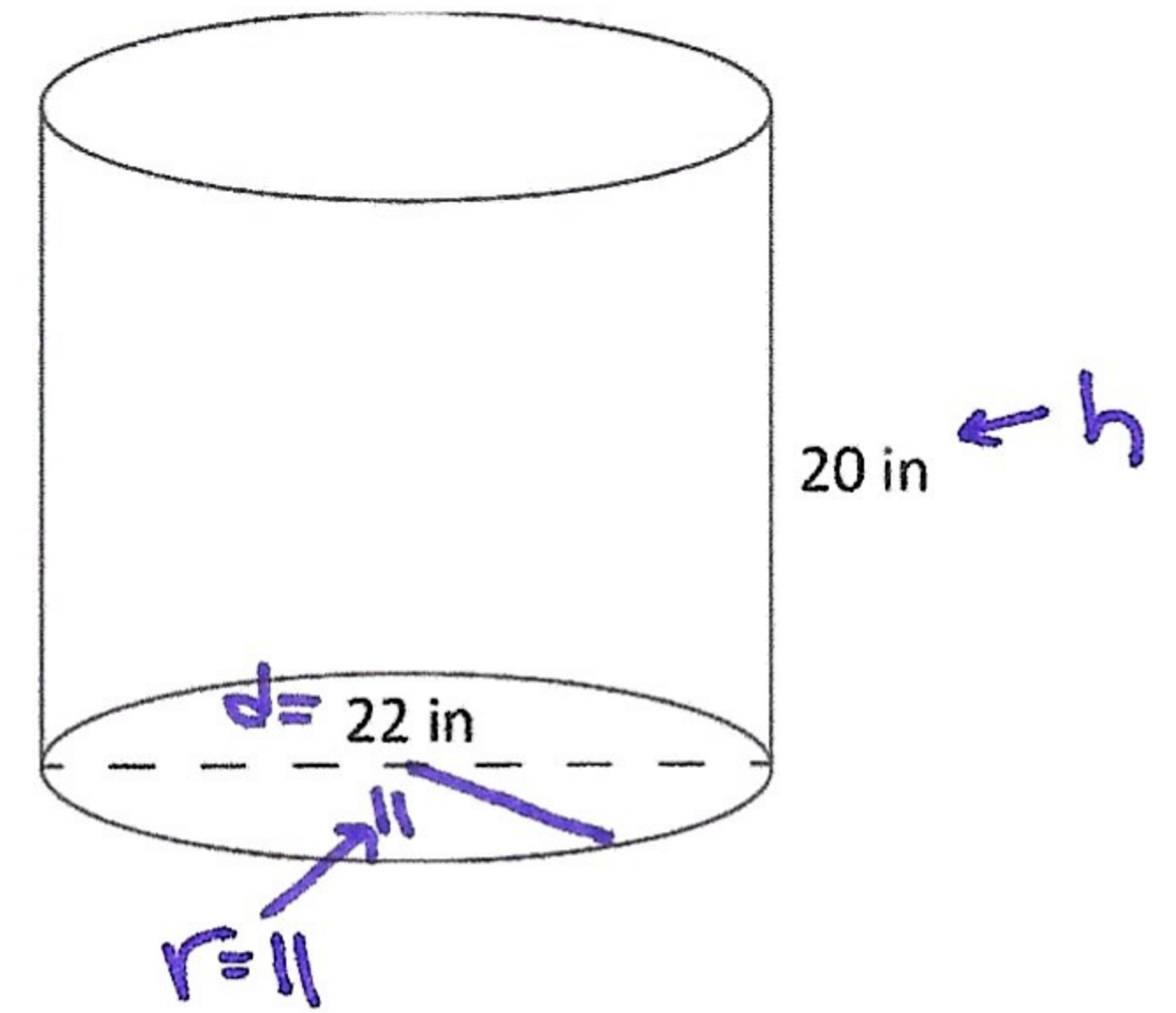
$P = $ Sum of sides
$P = 7 + 24 + 25$
$P = 56 ft$

4.   Find the surface area of the cylinder below. Round your answer to the nearest whole number.

$$SA_{cyl.} = 2\pi r^2 + 2\pi rh$$
$$SA = 2\pi(11)^2 + 2\pi(11)(20)$$
$$SA = 242\pi + 440\pi$$
$$SA = 682\pi$$
$$SA = 2{,}141.48 \text{ in}^2$$
$$SA = 2{,}141 \text{ in}^2$$

20 in ← h

d= 22 in

r = 11

5.   Find the volume of the rectangular prism below. Round your answer to the nearest whole number.

$$Volume = lwh$$
$$V = 12 \cdot 8.9 \cdot 6$$
$$V = 640.8 \text{ cm}^3$$

6 cm

12 cm

8.9 cm