

Name: _____

Key

Math 9 Review

Topics Covered this Year

Rate how confident you feel about each topic on a scale from 1-10. This will help guide your studying.

Chapter 1: The Number System and Exponent Laws

Chapter 2: Finance

Chapter 3: Rational Numbers

Chapter 4: Linear Relations (Graphing)

Chapter 5: Polynomials

Chapter 6: Linear Equations (Algebra)

Chapter 9: Similarity and Scale Factor

Note that Chapter 8 (which we will be completing in the coming weeks) is not included in this review pack, but will be on the final. We will not be covering Chapter 7, and it will not be on the final.

Necessary Skills:

Rate how confident you feel about each skill.

Solving word problems:

Drawing or interpreting diagrams to solve problems:

Justifying your solutions:

Communicating mathematically + explaining your thinking

Design a Study Plan. Consider what topics and types of questions you will focus on, and when you will set aside time to study.

Your final is on **Wednesday, June 19.**

Name: _____

Chapter 2 Review: Finance

1. Find the missing value for each of the following simple interest problems.

	Principal	Interest Rate	Time	Interest	Final Amount
(a)	\$1000	6%	2 years	\$120	\$1120
(b)	\$850	4%	3.5 years	\$119	\$969
(c)	\$200	11%	0.5 years	\$11	\$211
(d)	\$461.89	5.5%	18 months	\$38.11	\$500

$$A = P + Prt$$
$$500 = P \left(1 + 0.055 \cdot \frac{18}{12} \right) \quad P = 461.89$$

2. How much money will you need to invest in an account offering 7.5% simple interest in order to have \$1000 in total at the end of 5 years.

$$1000 = P (1 + 0.075 \times 5)$$
$$P = \$727.27$$

3. What ^{Principal} interest rate will earn \$250 in interest when invested for 30 months in an account offering 6% interest.

$$250 = P \cdot 0.06 \cdot \frac{30}{12}$$
$$P = \$1666.67$$

4. Which is the better investment?

Investment A: 5% simple interest for 5 years?

Investment B: 4.5% compound interest for 5 years?

$$A = 1000 + 1000 \cdot 0.05 \cdot 5$$
$$A = \$1250 \quad \checkmark$$

take $P = \$1000$ (or \$100)

$$A = 1000 \left(1 + \frac{0.045}{1} \right)^{(5 \cdot 1)}$$
$$A = \$1246.18$$

Chapter 1 Review: Powers and Exponent Laws

1. Complete this table.

Power	Base	Exponent	Repeated Multiplication	Standard Form
3^5	3	5	$3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$	243
$(-2)^4$	-2	4	$(-2)(-2)(-2)(-2)$	16
10^3	10	3	$10 \cdot 10 \cdot 10$	1000
-2^6	2	6	$-(2 \times 2 \times 2 \times 2 \times 2 \times 2)$	-64

2. Write as a power of 10.

(a) ten 10^1 (b) $10 \times 10 \times 10 \times 10$ 10^4 (c) -1 -10^0 (d) 10 000 000 10^7

3. Evaluate:

(a) $2^5 = 32$ (b) $5^3 = 125$ (c) $0.5^2 = 0.25$

4. Write as a single power:

(a) $8^3 \times 8^6 = 8^9$ (b) $4 \times 4^3 \times 4^8 = 4^{12}$ (c) $x^4 \times x^{41} = x^{45}$ (d) $4^{21} \div 4^7 = 4^{14}$
 (e) $9^{10} \div 9 = 9^9$ (f) $\frac{3^4 \times 3^5}{3^6 \times 3^2} = \frac{3^9}{3^8} = 3$ (g) $3^{17} \times 3^{12} = 3^{29}$ (h) $\left(\frac{a^7}{a^5}\right)^4 = \frac{a^{28}}{a^{20}} = a^8$
 (i) $d^8 \div d^6 = d^2$ (j) $3^8 \div 3^4 = 3^4$ (k) $\frac{6^9}{6^9} = 6^0 = 1$ (l) $a^4 \times a^8 \times a^2 = a^{14}$
 (m) $m^{14} \div m^2 = m^{12}$ (n) $(ab^3c^2)^4 = a^4b^{12}c^8$ (o) $\frac{x^4 \cdot x^6}{x} = \frac{x^{10}}{x^1} = x^9$ (p) $(2a^2b)^3 = 8a^6b^3$

5. Evaluate each of the following:

(a) $6^0 = 1$ (b) $1^{15} \times 1^4 \times 1^6 = 1$ (c) $\left(\frac{2}{5}\right)^3 = \frac{8}{125}$

6. Evaluate:

(a) $3^2 + 4^2 = 9 + 16 = 25$ (b) $(-5)^2 + (-12)^2 = 169$
 (c) $-2^3 + 10^2 = -8 + 100 = 92$ (d) $\left(\frac{2}{5}\right)^2 \times \left(-\frac{5}{8}\right)^2 = \frac{4}{25} \times \frac{25}{64} = \frac{1}{16}$

7. Write each power of a power as a single power, then evaluate it.

(a) $(9^8)^0 = 9^0 = 1$ (b) $[(-2)^4]^2 = (-2)^8 = 256$ (c) $-(3^2)^3 = -3^6 = -729$

8. Write each expression as a power, then evaluate it.

(a) $3^3 \times 3^2 = 3^5 = 243$ (b) $(-2)^4 \times (-2)^0 = (-2)^4 = 16$ (c) $5^{11} \div 5^{10} = 5^1 = 5$ (d) $10^8 \times 10^2 \div 10^6 = 10^4 = 10000$

9. For each pair of powers, which power is greater?

i) 8^3 or 3^8 ii) 2^{10} or 10^2 iii) 5^1 or 1^5

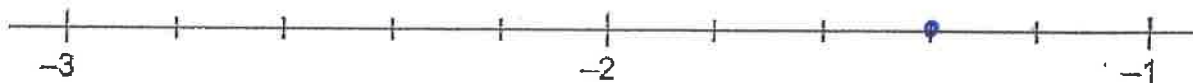
Chapter 3 – Rational Numbers

1. List 2 out of the 4 types of numbers that make up a rational number. Show an example of each.

$\frac{3}{4}, 0.75, 0.\bar{3}, 5$

2. Find 2 numbers that are between $-1\frac{2}{5}$ and $-2\frac{1}{3}$.

$-1\frac{3}{5}, -2$



3. Write the following from least to greatest.

$-0.5, -\frac{1}{2}, -\frac{2}{5}, 0.6, 1\frac{2}{9}, 1.23$

$-\frac{2}{5}$

1.23

$1\frac{2}{9}$

-0.5

$-\frac{1}{2}$

0.6

4. Determine each of the following:

(a) $\frac{3}{5} + \frac{-1}{3} = \frac{4}{15}$

(b) $\frac{-1}{4} + \frac{-2}{3} = \frac{-11}{12}$

(c) $\frac{1}{2} - \frac{7}{10} = \frac{-2}{10} = \frac{-1}{5}$

(d) $\frac{-3}{4} - \frac{1}{8} = \frac{-7}{8}$

(e) $\frac{5}{6} + \frac{4}{5} = \frac{49}{30}$

(f) $\frac{-1}{3} + \frac{11}{15} = \frac{6}{15}$

(g) $2\frac{2}{3} - 1\frac{1}{2} = 1\frac{1}{6}$

(h) $-4\frac{1}{2} + 1\frac{3}{10} = -\frac{9}{2} + \frac{13}{10} = \frac{-32}{10} = \frac{-16}{5}$

$-3\frac{1}{3} - 2\frac{3}{4} = -5\frac{13}{12} = -6\frac{1}{12}$

(i) $\frac{2}{5} \times \frac{3}{4} = \frac{3}{10}$

(j) $\frac{-3}{7} \times \frac{1}{6} = \frac{-1}{14}$

(k) $\frac{-5}{8} \cdot \left(\frac{-2}{3}\right) = \frac{5}{12}$

$$(l) \quad -3\frac{1}{3} \cdot 5\frac{1}{4} = -\frac{10}{3} \cdot \frac{21}{4} = -\frac{35}{2} \quad (m) \quad \frac{-3}{4} \div \frac{1}{10} = -\frac{3}{4} \cdot \frac{10}{1} = -\frac{15}{2} \quad (n) \quad 7\frac{1}{2} \div 3\frac{1}{3} = \frac{15}{2} \cdot \frac{3}{10} = \frac{9}{4}$$

$$(o) \quad \frac{5}{8} \div \left(-6\frac{2}{3}\right) = \frac{5}{8} \cdot \frac{-3}{20} = -\frac{3}{32} \quad (p) \quad 15 \div 2\frac{2}{5} = 15 \cdot \frac{5}{12} = \frac{25}{4}$$

4. Evaluate using BEDMAS:

$$(a) \quad \left(-\frac{3}{4}\right) + \frac{1}{3} \times \frac{1}{2} - \frac{11}{12} = -\frac{18}{12} = -\frac{3}{2}$$

$$-\frac{3}{4} + \frac{1}{6} - \frac{11}{12}$$

$$-\frac{9}{12} + \frac{2}{12} - \frac{11}{12}$$

$$(b) \quad \left(\frac{1}{2} + \frac{2}{5}\right)^2 - \frac{1}{5} \div 2\frac{1}{2}$$

$$\left(\frac{9}{10}\right)^2 - \frac{1}{5} \cdot \frac{2}{5}$$

$$\frac{81}{100} - \frac{2 \cdot 4}{25 \cdot 4} = \frac{73}{100}$$

Chapter 4 – Linear Relations

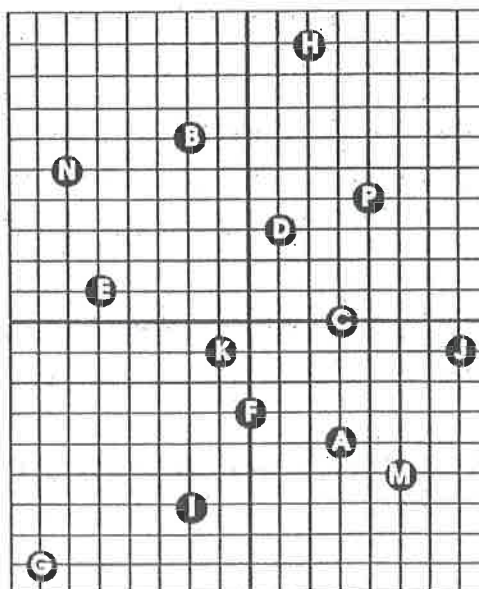
1. Use the words in the box to answer the following:

The coordinate plane has two number lines that intersect at a point called the origin. The horizontal number line is called the x-axis. The vertical number line is called the y-axis. The two axes divide the coordinate plane into four parts called quadrants. The location of a point on the graph is given using an ordered pair. The first number is the x-coordinate and the second number is the y-coordinate.

origin
x-coordinate
intercept
quadrants
coordinate
y-coordinate
x-axis
ordered pair
graph
y-axis

2. Find the coordinates of the indicated point:

- (a) A (3, -4)
- (b) I (-2, -6)
- (c) H (2, 9)
- (d) C (3, 0)
- (e) E (-5, 1)
- (f) N (-6, 5)



3. Write the next 3 values of y in each pattern. Then write an equation that shows the relationship between x and y .

(a)

x	1	2	3	4	5	6	7		30
y	11	13	15	17					

$$y = 2x + 9$$

(b)

x	1	2	3	4	5	6	7		25
y	7	11	15	19					

$$y = 4x + 3$$

4. Draw the next figure in the following pattern. Then write an equation that shows the relationship between the figure number (x) and the number of dots (y). Use your equation to find the number of dots in the 20th figure of the pattern.

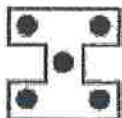


Figure 1

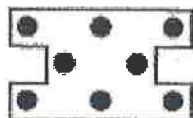


Figure 2



Figure 3

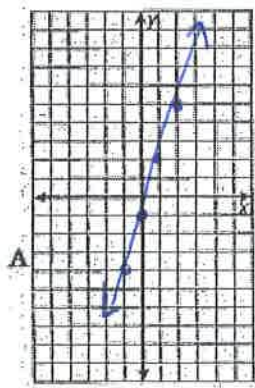
$$y = 3x + 2$$

Figure 4

5. Complete the table then graph and draw a line through them.

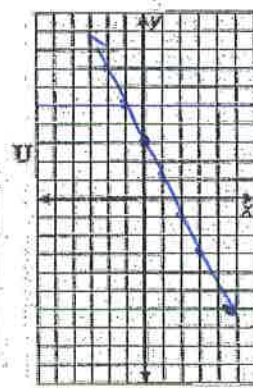
$$y = 3x - 1$$

x	y
3	8
2	5
-2	-7
0	-1



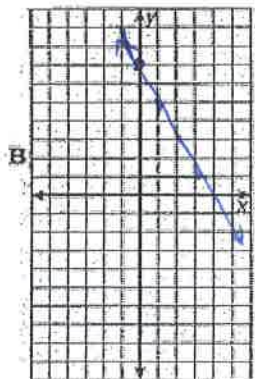
$$y = -2x + 3$$

x	y
5	-7
-3	9
2	-1
0	3



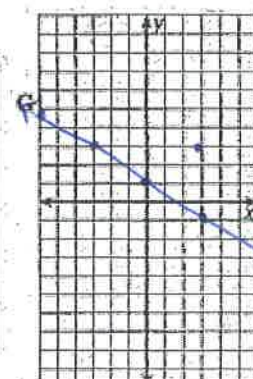
$$y = 7 - 2x$$

x	y
2	3
-1	9
5	-3
0	7



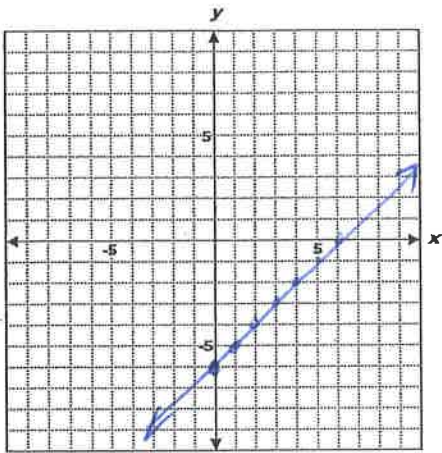
$$y = -\frac{2}{3}x + 1$$

x	y
6	-3
-6	5
3	-1
0	1



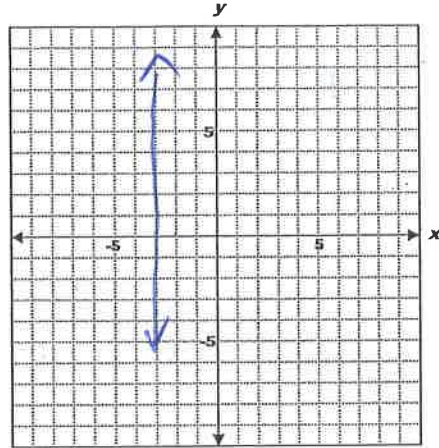
6. Graph each linear relation. You can create a table of values if needed.

a) $y = x - 6$



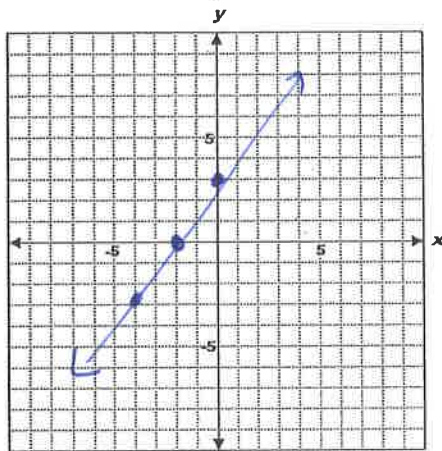
b) $x + 3 = 0$

$x = -3$



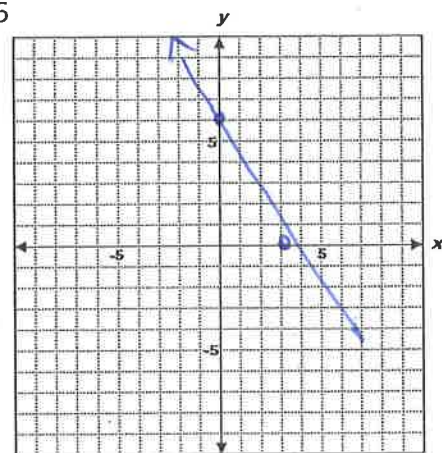
c) $2y - 3x = 6$

x	y
0	3
-2	0
-4	-3



d) $2x + y = 6$

x	y
0	6
3	0

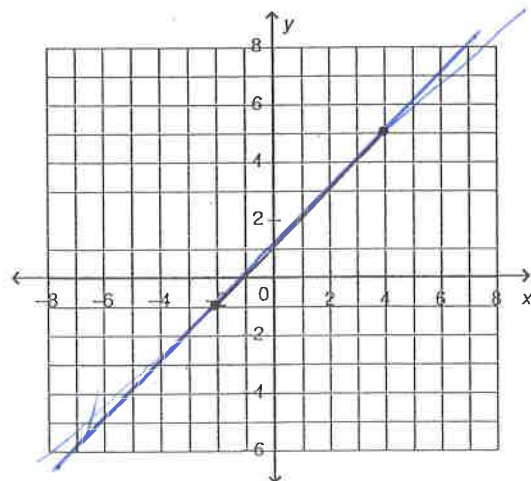


7. This graph represents a linear relation.

(a) When $x = 4$, $y = 5$

(b) When $x = -4$, $y = -3$

(c) When $y = 8$, $x = 7$



8. A car travels at a constant speed. The graph shows how the distance of the car changes with time.

(a) Estimate the time it takes to travel 130 km.

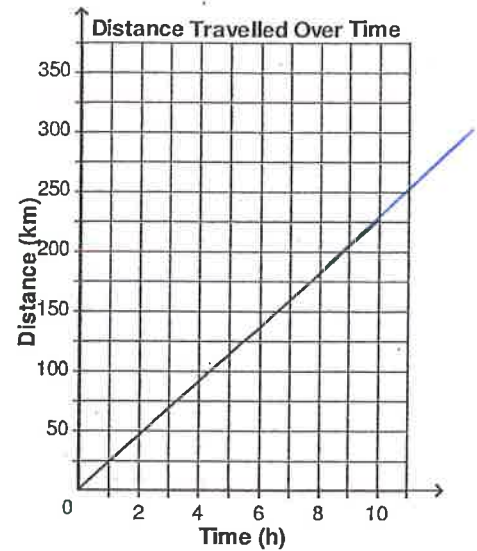
6h

(b) Estimate the time it take to travel 270 km.

11h

(c) Estimate the distance when the car travels for 3.5 hours.

85 km



Chapter 5 – Polynomials

For the questions with algebra tiles; white = positive and shaded = negative

1. For each expression, state whether it is a monomial, binomial, or trinomial. Then, identify the polynomial degree.

	Type of polynomial	Degree
(a) $x^3 - 2x + 3$	trinomial	3
(b) $3y^2 - 9y$	binomial	2
(c) $11c - 14$	binomial	1
(d) 24	constant (monomial)	0

2. Write a degree four trinomial with 3 different variables.

$$4a^2b^2 - 3c + 5$$

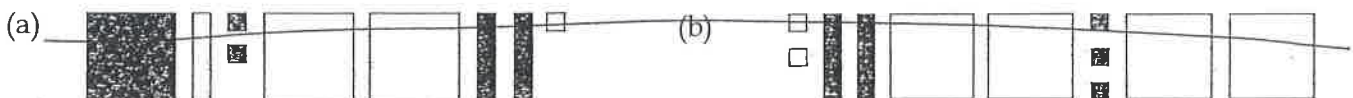
3. For the polynomial $-5x - 3x^4 + 5x^3 - 4$, identify the following:

Variable: x Degree: 4 Number of terms: 4

Write the polynomial in descending order:

$$-3x^4 + 5x^3 - 5x - 4$$

~~4~~ Write a polynomial expression in simplified form for the following algebra tiles.



5. Simplify by collecting like terms.

(a) $3y + 8 - 7y - 1 = -4y + 7$ (b) $-4y - 15 - 2y + 2 = -6y - 13$ (c) $-19 + 9y - y + 6 = 8y - 13$

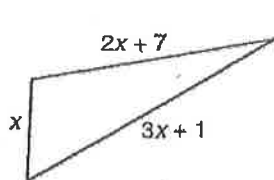
(d) $7a + 2b + 5 - 5a + 9b - 1$ (e) $-3a - 6b - 10 + 8a - b - 7$ (f) $20 - 15a + b + 6 + 4a - 4b$

$2a + 11b + 4$ $5a - 7b - 17$ $-11a - 3b + 26$

(g) $6n^2 + n + 15 + 3n^2 + 12n + 5$ (h) $3n^2 + n + 4 + 7n^2 + 9n + 5$ (i) $20 + 8n + n^2 + 3n + 8n^2 + 2n$

$9n^2 + 13n + 20$ $10n^2 + 10n + 9$ $9n^2 + 13n + 20$

6. Determine a simplified algebraic expression for the perimeter of the figure:



$P = 6x + 8$

7. Add the polynomials.

(a) $(5x - 7) + (2x - 3) = 7x - 10$

$5x - 7 + 2x - 3$

(c) $(6m + 6) + (6m - 6) = 12m$

$6m + 6 + 6m - 6$

8. Subtract the polynomials.

(a) $(2s - 4) - (2s + 3) = -7$

$2s - 4 - 2s - 3$

(c) $(4b + 7) - (6b + 8) = -2b - 1$

$4b + 7 - 6b - 8$

9. Use the distributive property to answer the following.

(a) $2(x - 3) = 2x - 6$

(b) $2(3x + 2) = 6x + 4$

(c) $3(2x + 4y + 1) = 6x + 12y + 3$

(d) $-2(5x - 2) = -10x + 4$

(e) $3(x + 2) + 5x = 8x + 6$

(f) $3(x + y) + 4(y + x) = 7x + 7y$

10. Fill in the missing algebra tiles for the following multiplication statements.

(a) $(x + 2)(x + 3) = x^2 + 5x + 6$

(b) $(2x + 3)(x + 2) = 2x^2 + 7x + 6$

11. Expand each of the following using FOIL. (Not on final, but good practice for next year)

(a) $(x+2)(x+3)$
 $x^2 + 5x + 6$

(b) $(s-4)(s-6)$
 $s^2 - 10s + 24$

(c) $(t-5)(t+11)$
 $t^2 + 6t - 55$

(d) $(x+3)^2$
 $(x+3)(x+3) = x^2 + 6x + 9$

(e) $(x+8)(x-8) = x^2 - 64$

12. Divide each of the following expressions.

(a) $\frac{4x^2 - 6x + 8}{2} = 2x^2 - 3x + 4$

(b) $\frac{9m^2 + 6m - 15}{-3} = -3m^2 - 2m + 5$

(c) $\frac{15x^2 - 20x}{5x} = 3x - 4$

(d) $\frac{16m^3 + 20m^2 - 4m}{4m} = 4m^2 + 5m - 1$

Chapter 6 – Equations and Inequalities

Solve each of the following equations:

1. $3n - 6 = 21$
 $n = 9$

2. $7c + 6 = 34$
 $c = 4$

3. $8 = \frac{k}{4} - 3$
 $k = 44$

4. $\frac{m}{7} + 2 = -4$
 $m = -42$

5. $15 + 9r - 2r = 1$
 $r = -2$

6. $-10 = -n + 2 - 2n$
 $n = 4$

7. $c + \frac{1}{6} = \frac{5}{3}$
 $c = \frac{9}{6} = \frac{3}{2}$

8. $-3(2x - 1) = -21$
 $x = 4$

9. $8 = -2(-3 - y)$
 $y = 1$

10. $0 = -12 - 2(n - 3)$
 $n = -3$

11. $-2(3n - 1) + 2n = 18$
 $n = -4$

12. $3(1 - 2y) + y = -2$
 $y = 1$

13. $7r - 5 = 2r + 5$
 $r = 2$

14. $4a + 2 = 6a - 12$
 $a = 7$

15. $2(p + 1) = 3(p - 1)$
 $p = 5$

16. $4x + 5 = 2x + 3$
 $x = -1$

17. $14 + 3c + 6 = 5 - 2c$
 $c = -3$

18. $5(2f + 3) = 6f - 5$
 $f = -5$

19. $2(4y - 3) = 3(2y + 4)$
 $y = 9$

20. $5n - 6.4 = 3n + 2.6$
 $n = 4.5$

21. $3(n - 2) - 19 = 5 + 2(n + 5)$
 $n = 40$

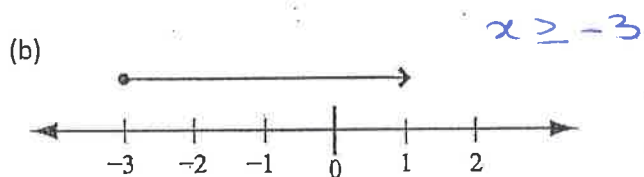
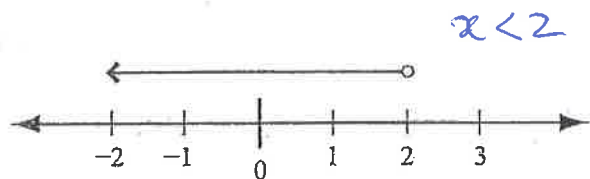
22. $2(a - 4) - 3(a - 2) = 4(a + 1) + 4$
 $a = -\frac{10}{5} = -2$

Solve each of the following equations. To eliminate the decimals, you can multiply by the appropriate power of 10 or solve "as is".

23. $5n - 6.4 = 3n + 2.6$
 $2n = 9$
 $n = 4.5$

24. $0.09x + 0.13(x + 10) = 20$
 $0.09x + 0.13x + 1.3 = 20 \quad / \cdot 100$
 $9x + 13x + 130 = 2000$
 $22x = 1870$
 $x = \frac{1870}{22} = 85$

25. State which inequality is represented by the number line.



26. Solve each of the following inequalities. Graph the solution.

(a) $4y + 7 \leq 3$ $y \leq -1$

(b) $9k - 2 > -20$ $9k > -18$
 $k > -2$

(c) $\frac{x}{2} + 15 < 16$ $\frac{x}{2} < 1$ $x < 2$

(d) $\frac{d}{3} - 8 \geq -10$ $\frac{d}{3} \geq -2$ $d \geq -6$

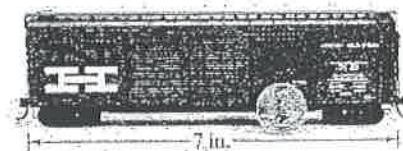
(e) $-3x + 2 \leq 14$ $-3x \leq 12$
 $x \geq -4$

(f) $-9x - 4 \geq 50$ $-9x \geq 54$
 $x \leq -6$

Chapter 9 – Similarity and Scale Factor

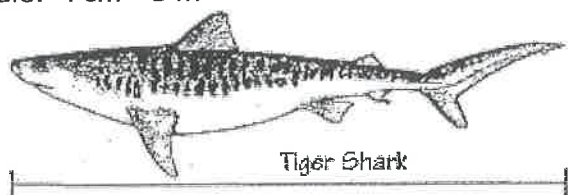
1. If the actual length of the boxcar is 609 inches, what is the scale factor used?

$$\frac{7}{609} = \frac{1}{87}$$



2. Measure each length to the nearest tenth. Then use the scale to find the actual length.

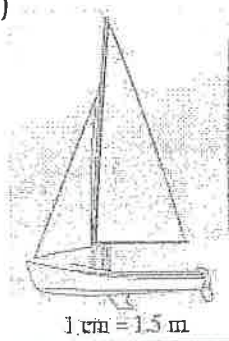
(a) Scale: 4 cm = 3 m



$$\frac{4 \text{ cm}}{3 \text{ m}} = \frac{7 \text{ cm}}{x}$$

$$x = \frac{3 \cdot 7}{4} = 5.25 \text{ m}$$

(b)

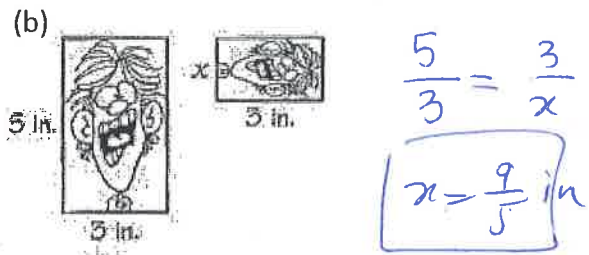
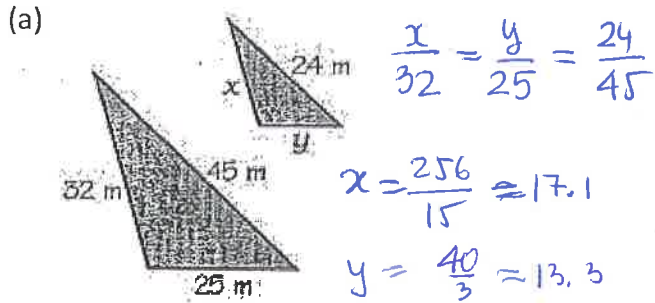


~~4 cm = 3 m~~

$$\frac{1 \text{ cm}}{1.5 \text{ m}} = \frac{2.8 \text{ cm}}{x}$$

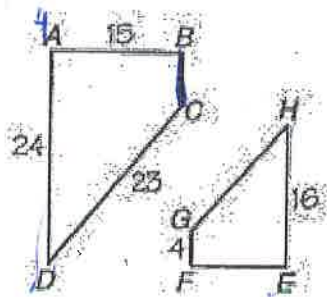
$$x = 4.2 \text{ m}$$

3. For each pair of similar figures, find the length of each side marked with a x and y .



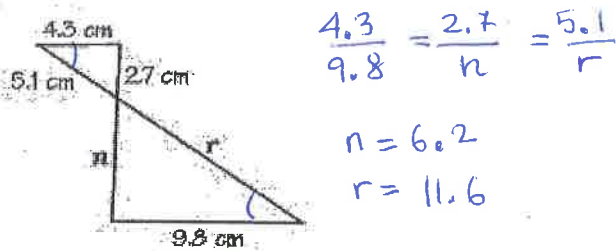
$$\frac{16}{24} = \frac{2}{3}$$

GH
BC
 $\angle E$

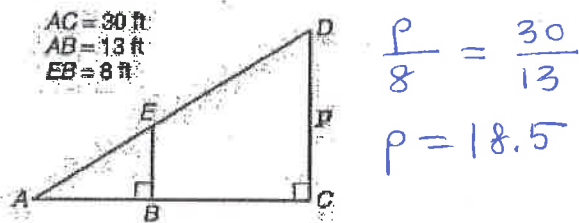


4. What is the scale factor of ABCD to EFGH?
Which side of EFGH corresponds to side CD?
Which side of ABCD corresponds to side GF?
Which angle of EFGH corresponds to $\angle A$?

5. Determine the value of n and r .



6. Determine the value of p .



6. Which of the following letters has vertical line symmetry?

T

U

F

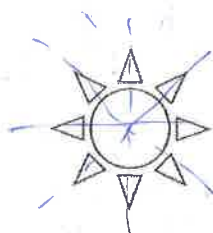
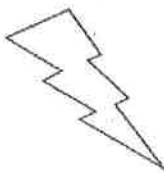
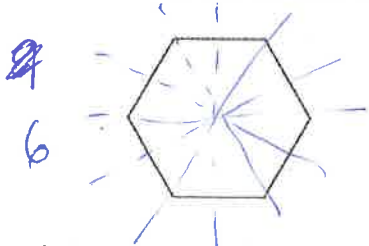
7. Which of the following letters has horizontal line symmetry?

D

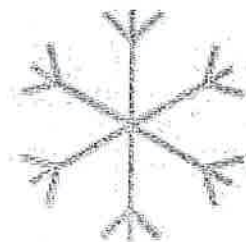
W

B

8. State the total number of lines of symmetry for each of the figures below.



9. For each figure, write the order of turn symmetry and calculate the angle of rotation.



Not on final,
but try it anyways!