

Pre-Algebra 8
Summer Packet

Directions: Please read all questions carefully. Show all of your work! Unless specified, calculators are permitted.

1) Use the picture to answer the following questions.

a) Region C is what fraction of the whole square?

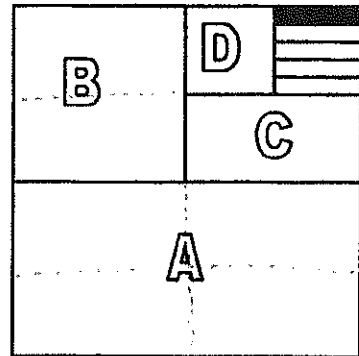
$$\frac{1}{8}$$

b) Region D is what fraction of Region A?

$$\frac{1}{8}$$

c) The shaded region is what fraction of Region B?

$$\frac{1}{20}$$



2) Jessica is raising money for charity by selling candles. She sells three candles for \$9.99.

a) Jessica's mother purchased 9 candles. How much money did her mother spend?

$$\begin{array}{l} \times 3 \left(\begin{array}{l} 3 \text{ for } \$9.99 \\ 9 \text{ for } ? \end{array} \right) \times 3 \end{array}$$

$$\begin{array}{r} 9.99 \\ \times 3 \\ \hline \$29.97 \end{array}$$

b) Jessica's sister only wants to buy 1 candle. How much should Jessica charge her sister?

$$\begin{array}{l} \div 3 \left(\begin{array}{l} 3 \text{ for } \$9.99 \\ 1 \text{ for } ? \end{array} \right) \div 3 \end{array}$$

$$\frac{9.99}{3} = \$3.33$$

c) For every 1 candle sold, \$2.50 goes to charity. What percentage of the price for one candle goes to charity?

$$\$2.50 \text{ out of } \$3.33 \Rightarrow \frac{2.50}{3.33} \Rightarrow$$

$$2.50 \div 3.33 \Rightarrow 0.75075 = 75\%$$

3) On her way to South Carolina, Ashley drove 560 miles on the highway. This trip on the highway took her about 10 hours. She used about 20 gallons of gas on this trip? Show your work.

a) On the highway, how many miles per hour was she driving?

$$\begin{array}{l} \underline{\hspace{1cm}} \\ \downarrow \\ 1 \text{ hr} \end{array}$$

$$\begin{array}{l} 560 \text{ miles in } 10 \text{ hours} \\ \div 10 \rightarrow ? \text{ in } 1 \text{ hour} \end{array}$$

$$560 \div 10$$

$$= \boxed{56 \text{ mph}}$$

b) How many miles to the gallon does Ashley's car get?

$$\begin{array}{l} \div 20 \left(\begin{array}{l} 560 \text{ miles in } 20 \text{ gallons} \\ ? \text{ in } 1 \text{ gallon} \end{array} \right) \div 20 \end{array}$$

$$560 \div 20 = \boxed{28 \text{ mpg}}$$

- 4) Insert the correct sign ($<$, $>$, or $=$) between the two numbers to make a true statement. Show the math you used to compare the two numbers.

a) $0.865 > 5/7$
 0.7143

b) $32% < 6/13$
 $0.46154 = 46.154%$

c) $2/5 > 3/8$
 0.4 0.375

- 5) Replace the question mark with a number that makes the equation true (creating equivalent fractions).

a) $\frac{6}{?} = \frac{24}{28}$
 $\times 4$ $\times 4$
 $? = 7$

b) $\frac{3}{?} = \frac{24}{32}$
 $\times 8$ $\times 8$
 $? = 4$

c) $\frac{6}{9} = \frac{?}{12}$
 $\times 1\frac{1}{3}$ $\times 1\frac{1}{3}$
 $? = 8$ * both reduce to $\frac{2}{3}$

- 6) A bucket contains 20 pencils. Some are red, some are blue, and some are yellow. The probability of drawing a red pencil is 65%. The probability of drawing a blue pencil is 15%.

- a) What is the probability of drawing a yellow pencil?

20%

red blue yellow
 $65\% + 15\% + ? = 100\%$
 $80\% + \underline{\quad} = 100\%$

- b) How many pencils of each color are in the bucket?

red: 65% of 20 $\Rightarrow 0.65 \times 20 = 13$
blue: 15% of 20 $\Rightarrow 0.15 \times 20 = 3$
yellow: 20% of 20 $\Rightarrow 0.2 \times 20 = 4$

- 7) Stephanie made a miniature model that is mathematically **similar** to a rectangular building. The miniature model has dimensions of 11cm by 6cm by 25cm.

- a) The building's actual dimensions are 275ft by 150ft by 625ft. What is the scale factor from the miniature model to the actual building?

$11 \times 6 \times 25$
 $275 \times 150 \times 625$
the lengths are 25 times longer
 $25 \times 25 = 625 \checkmark$
 $6 \times 25 = 150 \checkmark$
 $11 \times 25 = 275 \checkmark$

So, scale factor is $\boxed{25}$

- b) Stephanie wants to make a larger model. She decides she will make another model similar to the miniature model. She wants the length and width to be 33cm and 18cm. If the new model is similar to the old one, what is the height of the new model?

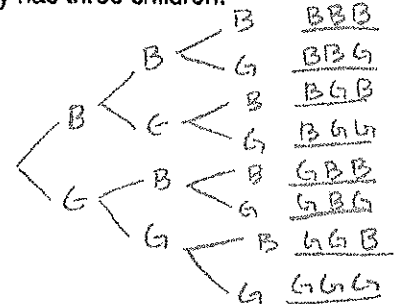
$11 \times 6 \times 25$
 $33 \times 18 \times ?$
 $\times 3$ $\times 3$ $\times 3$ times longer
 $25 \times 3 = \boxed{75\text{cm}}$

8) When Jane Smith grows up she wants to have three children. If she has girls, their names will be Gina (1st born), Grace (2nd born), and Gabby (3rd born). If she has boys, their names will be Brett (1st born), Bill (2nd born), and Bobby (3rd born). Jane is hoping for all girls.

a) List all of the possible combinations of boys and girls if Jane actually has three children.

GGG GBG BBG BBB
 GGB BGB
 BGG GBB

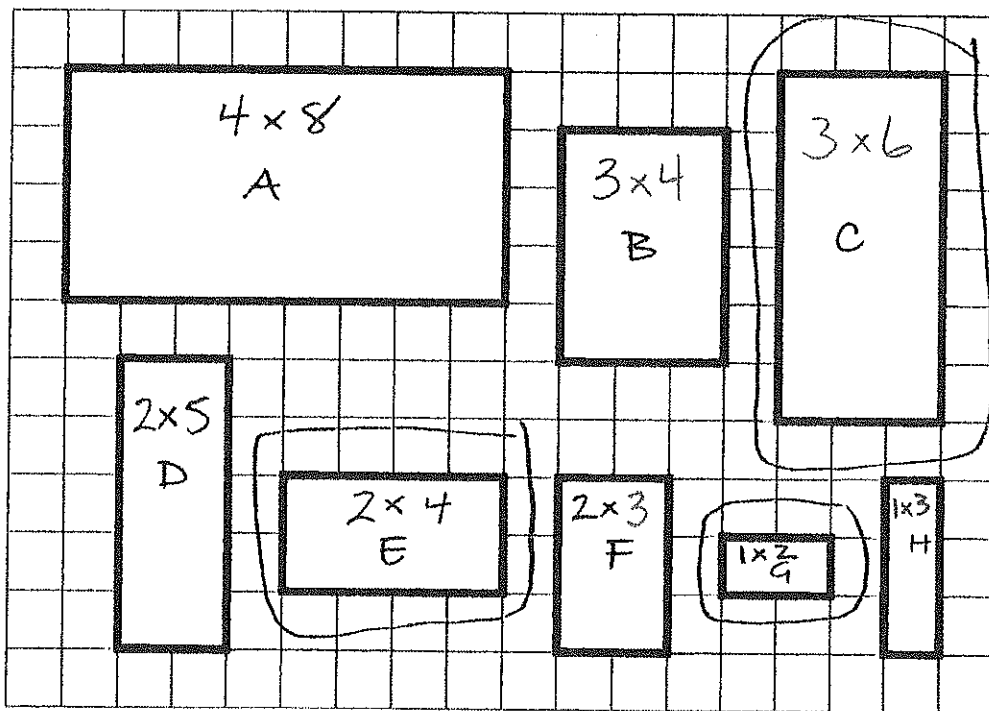
8 total combinations



b) What is the probability that Jane will have all girls?

$\frac{1}{8}$

9) Circle the three rectangles that are mathematically similar to Rectangle A.



Explain how you know they are similar. A is a 4x8 rectangle.
You can use a scale factor of $\frac{1}{2}$ to get to
E, the 2x4 rectangle. You can use a scale
factor of $\frac{1}{4}$ to get to G, the 1x2. You
 can use a scale factor of $\frac{3}{4}$ to get
 to C, the 3x6 rectangle. Also, all ratios
 of lengths to widths reduce to $\frac{1}{2}$.

10) Bethany went on a family vacation to South Carolina. During the first four hours, she recorded the total distance traveled every half hour.

Time (hrs)	Distance (miles)
0	0
0.5	35
1	70
1.5	105
2	140
2.5	175
3	210
3.5	245
4	280

a) How many miles per hour was Bethany's family travelling? 70mph

b) How many miles would Bethany's family travel in 6 hours?

$$70 \times 6 = 420\text{mi}$$

c) How long would it take to travel 315 miles?

$$315 \div 70 = 4.5\text{hrs}$$

d) Write an equation that would determine the distance, d , for any amount of time, t .

$$d = r \cdot t$$

$$d = (70) \cdot t$$

e) Use your equation to determine the distance traveled after 3.25 hours.

$$d = 70 \cdot (3.25)$$

$$d = 227.5\text{mi}$$

11) To answer each question, use the appropriate formula. Show all of your work and label all answers.

a) The radius of a circle is 4cm. What is the area? What is the circumference?

$$A = \pi r^2 = \pi \cdot (4)^2 = 50.27\text{cm}^2$$

$$C = \pi \cdot d = \pi \cdot 8 = 25.13\text{cm}$$

b) The area of a rectangle is 24 square inches and its width is 3in. What is the length of the rectangle? What is the perimeter of that rectangle? L must equal 8in .

$$A = L \cdot W$$

$$(24) = L \cdot 3$$

perimeter is $8+8+3+3 = 22\text{in}$

c) What are the possible dimensions of a rectangular prism with a volume of 12 cubic feet?

$$12 \times 1 \times 1$$

$$2 \times 2 \times 3$$

$$4 \times 3 \times 1$$

$$6 \times 2 \times 1$$

d) Find the surface area of a rectangular prism with dimensions of 4 by 5 by 6.

$$S = 2(LW + LH + WH)$$

$$= 2(4(5) + 4(6) + 5(6))$$

$$= 2(20 + 24 + 30) = 2(74) = 148\text{units}^2$$

e) If a can has a radius of 3in and a height of 8in, what is the surface area?

$$S = 2\pi(3)^2 + 6 \cdot \pi(8)$$

$$= 56.55 + 150.796$$

$$= 207.35\text{in}^2$$

f) Find the volume of an ice-cream cone with a radius of 2.5 inches and a height of 7 inches.

$$V = \frac{1}{3} \cdot \pi (2.5)^2 \cdot 7$$

$$= 45.815\text{in}^3$$

Important Formulas

Area

$$\text{Rectangle} = L \times W$$

$$\text{Triangle} = \frac{1}{2} \times \text{Base Length} \times H$$

$$\text{Circle} = \pi r^2$$

Perimeter = the distance around a shape.

Circumference

$$\text{Circle} = d\pi \text{ (diameter} = 2r)$$

Volume

$$\text{Rectangular Prism} = L \times W \times H$$

$$\text{Cylinder} = \pi r^2 H$$

$$\text{Cone} = \frac{1}{3} (\pi r^2 H)$$

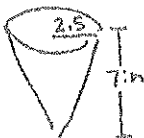
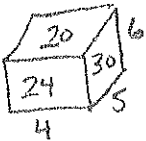
$$\text{Sphere} = \frac{2}{3} (\pi r^2 H)$$

Surface Area

$$\text{Rectangular Prism} = 2(LW + LH + WH)$$

$$\text{Cylinder} = 2\pi r^2 + d\pi H$$

$$3 \times 8 = 24$$



NON CALCULATOR!

12) Find the sum.

a) $-17 + 31 = +14$ c) $-31 + 44 = +13$ e) $-9 + -19 = -28$
 b) $-42 + 10 = -32$ d) $-50 + -48 = -98$ f) $-2 + 19 = 17$

13) Find the difference.

a) $-29 - 40 = -69$ c) $-11 - 4 = -15$ e) $-2 - -12 = 10$
 $\hookrightarrow -29 + -40$ $\hookrightarrow -11 + -4$ $\hookrightarrow -2 + +12$
 b) $-35 - 20 = -55$ d) $-75 - -50 = -25$ f) $-7 - 12 = -19$
 $\hookrightarrow -35 + -20$ $\hookrightarrow -75 + +50$ $\hookrightarrow -7 + -12$

Rule:

14) Find the product.

neg · neg = pos
 neg · pos = neg

a) $-11 \cdot 4 = -44$ c) $-5 \cdot 4 = -20$ e) $-9 \cdot -9 = +81$
 b) $-30 \cdot 4 = -120$ d) $-15 \cdot -5 = +75$ f) $-\frac{1}{2} \cdot \frac{3}{4} = -\frac{3}{8}$
 $\frac{-1}{2} \cdot \frac{3}{4} = \frac{-1 \cdot 3}{2 \cdot 4} = \frac{-3}{8}$

15) Find the quotient.

neg ÷ neg = pos
 neg ÷ pos = neg

a) $-88 \div 4 = -22$ c) $-48 \div 4 = -12$ e) $-9 \div -9 = +1$
 b) $-100 \div 20 = -5$ d) $-15 \div -5 = +3$ f) $-\frac{1}{4} \div \frac{1}{2} = -\frac{1}{2}$
 $-\frac{1}{4} \div \frac{1}{2} \rightarrow -\frac{1}{4} \times \frac{2}{1} = -\frac{2}{4} = -\frac{1}{2}$

16) Evaluate each of the expressions if the value of $x = 5$ and $y = -2$. Show your work.

a) $\frac{1}{2}(x + y)$ b) $x^2 + y^3$ c) $5x + 4y$
 $\frac{1}{2}((5) + (-2))$ $(5)^2 + (-2)^3$ $5(5) + 4(-2)$
 $\frac{1}{2}(3)$ $25 + -8$ $25 + -8$
 $\frac{3}{2} = 1.5$ 17 17

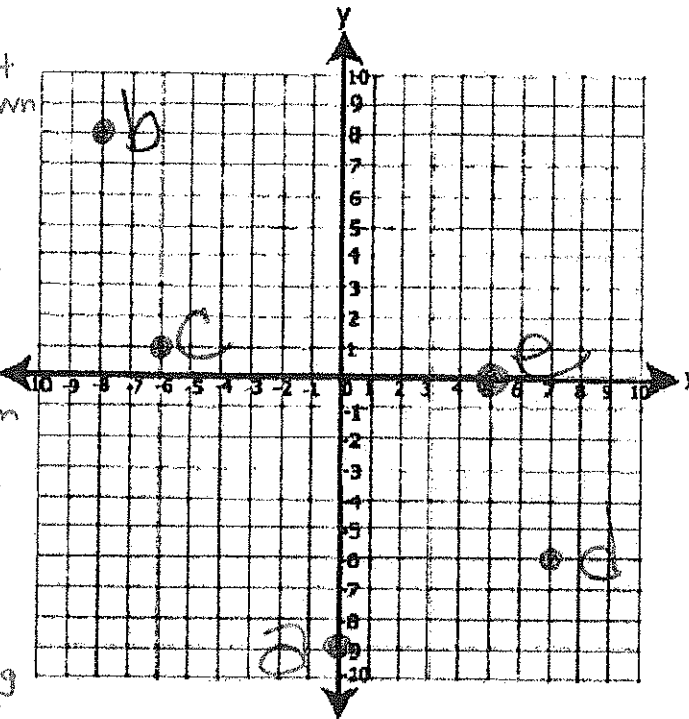
17) Solve each equation for the value of n . Show your work.

a) $-5n = 45$ b) $80 + n = 60$ c) $4n + 5 = -7$
 $\frac{-1}{5} \cdot \frac{-1}{-5}$ $\frac{-80}{-80}$ $\frac{-60}{-60}$ $\frac{-5}{-5}$
 $n = -9$ $n = -20$ $\frac{4n}{4} = \frac{-12}{4}$
 $n = -3$

"undo" each problem by doing the same operation to each side.

18) Plot the points on the coordinate graph. Label each point with the correct letter.

- a) (0, -9) 0 units left
9 units down
- b) (-8, 8) 8 units left
8 units up
- c) (-6, 1) 6 units left
1 unit up
- d) (7, -6) 7 units right
6 units down
- e) (5, 0) 5 units right
0 units down



(x, y)
 ↑ left if negative
 ↓ right if positive
 ↖ down if neg
 ↗ up if pos

19) The following table shows how the two variables are related. Find a pattern in each table. Use the pattern to complete the missing entries. Express the rule for the pattern as an equation, using the given letters as variables.

X	0	1	2	3	A	8	20
Y	0	7	14	21	28	B	C

A = 4 B = 56 C = 140 Equation: $x \cdot 7 = Y$
 or
 $7x = Y$