Examples:

a. What percent of 300 is 75?

	Basic	Total
Part	X	75
Whole	100	300

$\frac{X}{100} = \frac{75}{300}$ ×3

$3x = 75$ so $x = 25$

75 is $\boxed{25\%}$ of 300.

b. At a constant rate of 80 mph, how long would it take to travel 440 miles?

	Basic	Total
miles	80	440
hours	1	H

$\frac{80}{1} = \frac{440}{H}$ ×5.5

$1(5.5) = H$ so $H = 5.5$

It would take 5.5 hours to travel 440 miles.

c. If $4x + 36 = 76$, how much does $x + 9$ equal?

	Basic	Total
expres	4x+36	x+9
value	76	X

$\frac{4x+36}{76} = \frac{x+9}{x}$ ×4

$4x = 76$ $x = 19$

The value of $x+9$ is $\boxed{19}$.

d. The ratio of a rectangular floor's width to length is 3:4. The length of the floor is 16 feet. Find the area of the floor in square feet. $= \ell \times w$

	Basic	Total
width	3	W
length	4	16

$\frac{3}{4} = \frac{W}{16}$ ×4

$W = 3(4) = 12$

Now area $= \ell \times w = 12 \times 16 = 192$ sq. ft.

Superfluous

e. It takes 20 sacks of flour to make 1 batch of Krispy Kreme donuts. Each sack contains 32 cups of flour. If one bag is enough to make 6 dozen donuts, how much flour is used per donut? unit ratio   answer

	Basic	Total
flour	32	F
donuts	72	1

get into units will have the answer

cups of flour and # donuts

32 cups make 6(12) donuts

$\frac{32}{72} = \frac{F}{1}$ ×72

$72F = 32$

$F = \frac{32}{72} = \frac{4}{9}$

It takes $\frac{4}{9}$ c. flour to make 1 donut

f. A pattern shows a circle with area 25π square inches. The scale factor for the pattern is that 1 inch on the pattern = 8 inches on the fabric. Find the area in square inches of fabric that is needed to make the circle on the fabric.

Radius

	Basic	Total
pattern	1	5
full size	8	R

$\frac{1}{8} = \frac{5}{R}$ ×5

$R = 8(5) = 40$

So Radius = 40

* Area $= 25\pi$ in² is not linear measure so can't use 1 inch to 8 in.

Find radius which will be measured in inches and is also needed to answer actual question.

$\pi r^2 = 25\pi$ means r on pattern = 5 in

and area of fabric $= \pi(40^2) = 1600\pi$ sq. inches

MATH 304   Ratio and Proportion   Name _____Solution Key_____ Seat # _____

There are many ways to do each of these problems. HOWEVER, for this worksheet, I want you to **set up a proportion** that will answer or assist you in answering the question. **Then solve** the problem. I want you to see that each of these can be interpreted and solved as a proportion problem.

1. Mary gets a token every time she completes her homework and turns it in on time. When she gets 5 tokens, she can trade them in to her grandmother for 75 cents. How many times would she need to do her homework and turn it in on time in order to earn $9.00?

	Basic	Total
tokens	5	T
$	$0.75	$9.00

Solve: $\dfrac{5}{\$0.75} = \dfrac{T}{\$9.00}$ (×12)

$T = 5(12)$
$T = 60$

Sentence: May need to do and turn in her homework $\boxed{12 \text{ times}}$ to earn $9.$^{00}.

2. In a bag of red and green marbles, there are 2 green marbles for every 8 red marbles.

    (a) What is the ratio of green marbles: red marbles?   G:R   2:8   = 1:4

    (b) What fraction of the marbles are red? $\dfrac{8}{10}$ $= \dfrac{4}{5}$ ← must be total to be fraction

    (c) If there are 80 green marbles in the bag, how many red marbles are in the bag?

	Basic	total
green	2	80
red	8	R

Solve: $\dfrac{2}{8} = \dfrac{80}{R}$ (×40)

$R = 8(40) = 320$

Sentence: There are $\boxed{320 \text{ red}}$ marbles in the bag.

3. Write a **proportion** that would represent this problem and then solve it as a proportion problem:
    "What percent of 228 is 57?"

	Basic	Total
Part	P	57
Whole	100	228

Solve: $\left(\dfrac{P}{100} = \dfrac{57}{228}\right)$ ×4 (÷4)

$4P = 100$
$P = \dfrac{100}{4} = 25$

Sentence: 57 is $\boxed{25\%}$ of 228.

4. Write a **proportion** that would represent this problem and then solve it as a proportion problem:
    "Six boxes are 20% of _____."

	Basic	Total
	%	Boxes
Part	20	6
Whole	100	B

Solve: ×5 $\left(\dfrac{20}{100} = \dfrac{6}{B}\right)$ ×5

$6(5) = B$
$30 = B$

Sentence: Six boxes are 20% of $\boxed{30 \text{ boxes.}}$

5. The ratio of a rectangular floor's width to length is 2 to 3. The length of the floor is 12 meters. Find the perimeter of the floor in meters.

	Basic	Total
Width	2	W
length	3	12

Solve: $\dfrac{2}{3} = \dfrac{W}{12}$ $2(4) = W$
   $8 = W$

Sentence: The width of the floor is $\boxed{8 \text{ meters}}$.

The perimeter of the floor is $2(12) + 2(8)$
$= 24 + 16$
$= 40\text{ m}$

6. The weight of a sack of grain together and another third of this weight equals 24 pounds in all. What is the weight of just one sack of grain in pounds?

	Basic	Total
SACKS	1	$1\frac{1}{3}$
Pounds	X	24

Solve: $\dfrac{1}{X} = \dfrac{1\frac{1}{3}}{24}$ $X = \dfrac{24}{1\frac{1}{3}} = 24 \cdot \dfrac{3}{4} = 18$

Sentence: 1 Sack of grain weighs $\boxed{18 \text{ pounds}}$ ✓

7. Classified ads in a newspaper cost \$1.50 for every 25 words. How many words must be deleted from the text of an 86-word ad to make the ad cost \$4.50?

	Basic	Total
Words	25	W
\$	\$1.50	4.50

Solve: $\dfrac{25}{\$1.50} = \dfrac{W}{\$4.50}$ $W = 3(25) = 75$
   $86 - 75 = 11$

Sentence: $\boxed{11 \text{ words}}$ must be deleted.

8. A box of laundry detergent contains 40 cups of power. If one box is enough to do 32 loads of laundry, how much detergent is used per load?

	Basic	Total
Powder	P	1 Box ≠ 40 cups
L. Load	1	32

Solve: $\dfrac{P}{1} = \dfrac{40}{32}$ $32P = 40$
   $P = \dfrac{40}{32} = \dfrac{5}{4}$

Sentence: It takes $\boxed{\frac{5}{4}\text{ cup}}$ (1.25 cup) of detergent to do 1 load of laundry.

9. Michael earns a commission of \$1 for every \$4 he sells. If his total sales are \$300, what will his commission be?

	Basic	Total
Commis	\$1	C
Sales	\$4	\$300

Solve: $\dfrac{1}{4} = \dfrac{C}{300}$ $C = 1 \times 75 = 75$

Sentence: Michael's commission will be $\boxed{\$75.^{00}}$

10. A region of land is surveyed that corresponds to a flat, circular area of 4π sq. in. on a map. The **map scale for distance** is 1 inch = 60 miles. Find the area of in square miles of the land that was surveyed.

(handwritten notes): ×2 ×4π

	basic	Radius
map inch	1	2
miles land	60	R

$\pi r^2 = 4\pi$

$\pi r^2 = 14,400\pi$

Area $= \pi r^2 = 4\pi$ on map means $r = 2$

Solve: $\dfrac{1}{60} = \dfrac{2}{R}$ $60(2) = R$ $120 = R$

×2

AREA of LAND radius 120 miles

$= \pi(120)^2 = \boxed{14,400\pi \text{ sq. miles}}$ ✓

(left margin): ✗ radius area NOT proportional

11. 54% of the registered voters in a district actually voted in a recent election. If the district has 350 registered voters, how many of them voted?

	basic	Total
voted	54	V
registered	100	350

3.5

Solve: $\dfrac{54}{100} = \dfrac{V}{350}$ $V = 54(3.5) = 189$

× 3.5 ✓

Sentence: $\boxed{189}$ of the registered voters actually $\boxed{\text{voted}}$

12. 3% of (A + G) is 12. What does G equal if A = 135?   ×4

	Basic	Total
part	3	12
whole	100	135+G

Solve: $\dfrac{3}{100} = \dfrac{12}{135+G}$

×4

$100(4) = 135 + G$
$400 = 135 + G$
$\dfrac{135}{265} = G$

Sentence: G equals $\boxed{265.}$ ✓

13. The edge around a metal frame has a perimeter of 42 inches. The frame is shaped like an equilateral triangle. What is the length of each side of the metal frame?

Ratio of side equilateral to Perimeter is 1:3

	Basic	Total
part	1	S
whole	3	42

×14

Solve: $\dfrac{1}{3} = \dfrac{S}{42}$ $1(14) = S$ $14 = S$ ✓

Sentence: Each side of the frame is $\boxed{14 \text{ inches.}}$

(left margin): Infer Ratio

14. The radius of circle A forms a ratio of 1 to 3 with the radius of circle B.
   (a) What ratio does A's circumference form with B's circumference?

	Basic	Circum
A	1	2π
B	3	6π

×2

Solve: $\dfrac{1}{3} = \dfrac{2\pi}{6\pi}$ is a true proportion ✓

Sentence: Ratio of Circum A to Circum B $= \boxed{\begin{array}{c}2\pi : 6\pi \\ 1 : 3\end{array}}$

(left margin): asking is this a true proportion

   (b) Is the length of the radius of a circle proportional to the circumference of the circle?

$\boxed{\text{yes,}}$ circumference and radius of circles are proportional

15. ADR granola bars are packed 6 per box and each bar supplied 2 grams of protein. How many such boxes would supply 36 grams of protein?

1 Box supplies 12 grams

	Basic	Total
Box	1	B
g.p.	12	36

Solve: $\dfrac{1}{12} = \dfrac{B}{36}$ (×3)

$1(3) = B$
$3 = B$

Sentence: It takes 3 Boxes of bars to supply 36 grams of protein.

16. Alexa has asked one of her friends to feed her 3 dogs while she is away on vacation. Each dog eats $1\frac{1}{2}$ bags of dog food per week. How many bags of food should Alexa leave for her dogs to eat if she will be gone 4 weeks?

3 ratios

	Basic	1 Bag	4 wks Total
part	1	1.5	6.0
whole	3	4.5	18.0

Solve: $\dfrac{1}{3} = \dfrac{6}{B}$ (×6)

$3(6) = B$
$18 = B$

Sentence: Alexa needs to leave 18 bags of food to feed 3 dogs for 4 weeks.

17. A miller keeps 10% of the flour she grinds for customers as a service fee. If she gives a customer (W+2) tons, how much flour was ground in all for that order?

Fee

	Basic	Total
Customer	90	W+2
Whole	100	F

Asks for customer (customer)
So need
fee : customer
Not fee : total

Solve: $\dfrac{90}{100} = \dfrac{W+2}{F}$

$90F = 100(W+2)$
$F = \dfrac{100}{90}(W+2)$
$= \dfrac{10}{9}(W+2)$

Sentence: The miller ground a total of $\dfrac{10}{9}W + \dfrac{20}{9}$ $= 1.1W + 2.2$ tons

18. A distance of 700 miles on the ground is represented by 3.5 inches on a certain map. What distance on the ground is represented by 1 inch on the map?

	Basic	Total
MAP inche	1	3.5
Ground miles	M	700

Solve: $\dfrac{1}{M} = \dfrac{3.5}{700}$ ×200

$1(200) = M$
$200 = M$

Sentence: 1 inch on the map equals 200 miles on the ground

19. If a car has traveled 150 miles in 3 hours and continues at the same rate, how far wil it travel in the next 2 hours.

	Basic	Total
miles	50	M
hours	3	2

Solve: $\left(\dfrac{150}{3} = \dfrac{M}{2}\right)$ ×50

$M = 2(50)$
$M = 100$

Sentence: The car will travel 100 miles in 2 hours.

20. Joni biked 36 miles in 2 days and her friend Marcus biked 24 miles in that same amount of time. For every 3 miles that Joni traveled, how many miles did Marcus travel?

Solve: $\dfrac{3}{M} \overset{\times 12}{=} \dfrac{36}{24}$ $12M = 24$

$M = 2$

	Basic	Total
Joni	3	36
Marcus	M	24

3

Sentence: For every 3 miles Joni travels Marcus travels [2 miles.] ✓

21. A store promotion offers to customers a refund of 5% of the amount they spend. If a person spends $80, what will be the amount of the refund?

Solve: $\times 20 \left(\dfrac{5}{100} = \dfrac{R}{80} \right) \times 20$ $R(20) = 80$

$R = 4$ ✓

	Basic	Total
Refund	5	R
Spent	100	80

Sentence: The refund amount is $4.^{00},

22. If 5 = 2b + 3, what number will equal 12b + 18.

Solve: $\dfrac{5}{2b+3} \overset{\times 6}{=} \dfrac{N}{12b+18}$ $N = 5(6)$

$= 30$

	Basic	Total
Value	5	N
EQ	2b+3	12b+18

Sentence: [N = 30]. ~~12b~~ $12b + 18 = 30$

23. If I drive my car and it gets 315 miles and use 15 gallons of gas to do it, how many miles per gallon did the car get?

Solve: $\dfrac{M}{1} \overset{\times 15}{=} \dfrac{315}{15}$ $15M = 315$

$M = \dfrac{315}{15} = 21$

	Basic	Total
miles	M	315
gallons	1	15

Sentence: The car is getting 21 miles per gallon. [21 mpg] ✓