Pretest-

- Try these problems now--
- 1) 7 % of ____ equals 42?
- 2) 9 is ___ % of 45 ?
- 3) 13 % of ___ equals 52?
- 4) 20 is ___% of 500 =

- Check your answers on the next slide. You might not need to do this lesson if you get them right.

Ratios and Proportions:

A Method to Solve Hard Percent Problems

By: Brett Taylor
MyGEDClass.com

Pretest-

- Try these problems now--
- 1) 7 % of ____ equals 42?
- 2) 9 is ___ % of 45 ?
- 3) 13 % of ___ equals 52?
- 4) 20 is ___% of 500 =

- Check your answers on the next slide. You might not need to do this lesson if you get them right.

Pretest Answers

- Check your answers---
- 1) 7% of **600** equals 42? **600**
- 2) 9 is **20** % of 45 ? **20**
- 3) 13 % of **400** equals 52? **400**
- 4) 20 is **4**% of 500 = **4%**

- If you were able to answer all these questions correctly, you do not need to do this lesson.

Let's Learn One Way To Do Hard Percent Problems

- The method I'm teaching has a story behind it.

- We will learn to use ratios and proportions to solve hard percent problems.

Ratios

- A ratio is a comparison of two quantities or amounts.

Examples of Ratios

- In Florida the Class Size Amendment is concerned with the **ratio** of teachers to pupils in a school.

- A doctor might order 4 mg of ampicillin per pound of body weight.

- To qualify you for a loan a lender will calculate your debt to income **ratio** .

Ratios

If you had 3 kids, 2 dogs, 1 cat, and 2 birds, what would be the **ratio** of kids to pets?

A. 3 / 5

B. 5 / 3

C. 1 / 2

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Ratios

If you had 3 kids, 2 dogs, 1 cat, and 2 birds, what would be the **ratio** of pets to kids?

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B. 5 / 3

C. 1 / 2

Ratios

If you had 3 kids, 2 dogs, 1 cat, and 2 birds, what would be the **ratio** of pets to kids?

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All Percents are Ratios

- A ratio is a comparison of two numbers.
- A percent is comparing a number to 100.

All Percents are Ratios

- A ratio is a comparison of two numbers.
- A percent is comparing a number to 100.
- 40% means 40 out of every 100 or

  a ratio of 40 to every 100

  or 40/100

Proportions

- A proportion is when two ratios and equal.

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- For example- On a map the key says that 1 inch equals 20 miles. That ratio , 1 / 20 , will be equal to the ratio of:

the number of inches between St. Petersburg and Tampa on the map

AND

the actual distance.

Proportions

- A proportion is when two ratios and equal.
- For example- On a map the key says that 1 inch equals 20 miles. That ratio , 1/20 , will be equal to the ratio of the number of inches between St. Petersburg and Tampa on the map and the actual distance.
- If the distance on the map is 2 inches, then the proportion will be:

$$1/20 = 2/x$$

Solving Proportions for Unknowns

To find an unknown number in a proportion there are two steps-

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To find an unknown number in a proportion there are two steps-

Step 1- Multiply the two numbers across from each other up and down.

Step 2- Divide that answer by the other number.

Solving Proportions for Unknowns

To find an unknown number in a proportion there are two steps-

Step 1- Multiply the two numbers across from each other up and down.

Step 2- Divide that answer by the other number.

$$1 / 20 = 2 / x$$

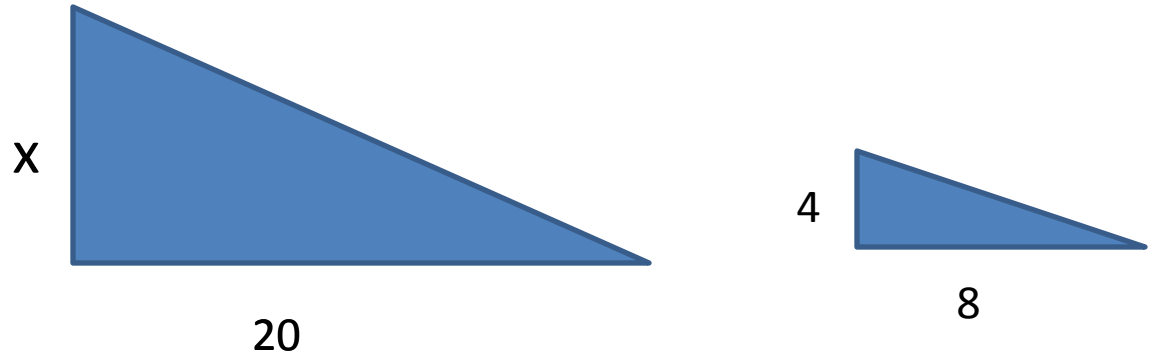
Multiply 2 x 20 (40)

Divide that answer by the other number (1)

40 / 1 = 40

Solving Proportions for Unknowns

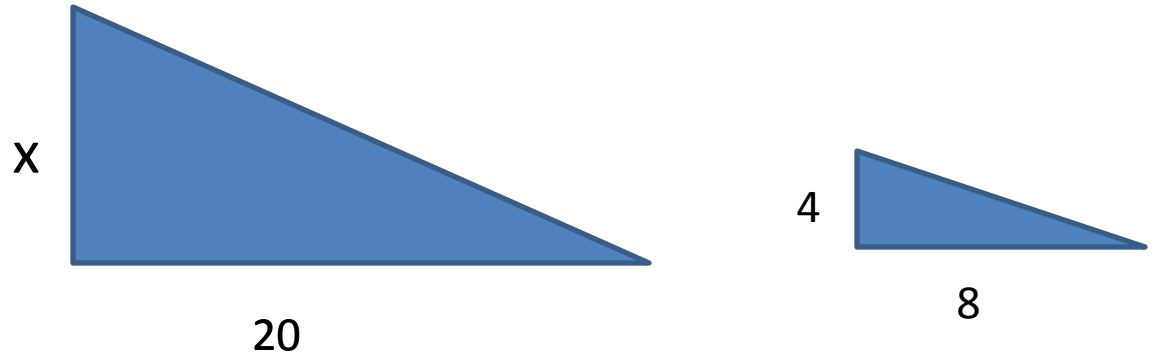
Corresponding sides of similar triangles are proportional.



Set up a proportion.

Solving Proportions for Unknowns

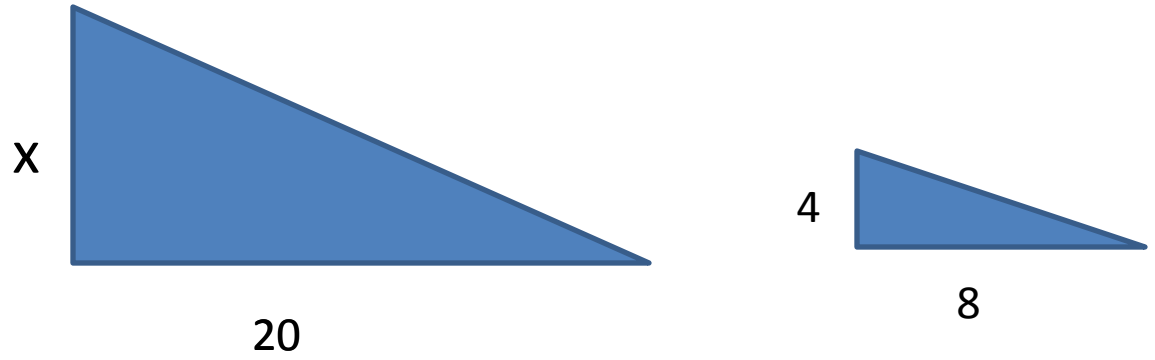
Corresponding sides of similar triangles are proportional.



$$\frac{x}{20} = \frac{4}{8}$$

Solving Proportions for Unknowns

Corresponding sides of similar triangles are proportional.



$$\frac{x}{20} = \frac{4}{8}$$

Solve for the missing side

Solving Proportions for Unknowns

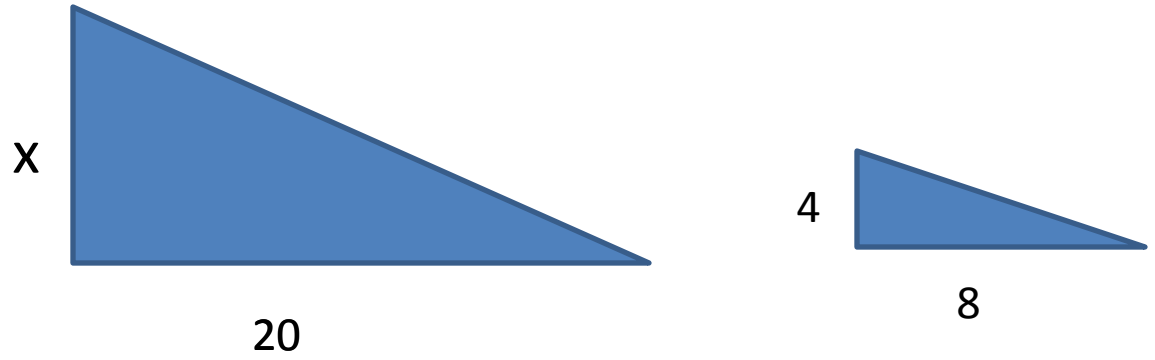
To find an unknown number in a proportion there are two steps-

Step 1- Multiply the two numbers across from each other up and down.

Step 2- Divide that answer by the other number.

Solving Proportions for Unknowns

Corresponding sides of similar triangles are proportional.

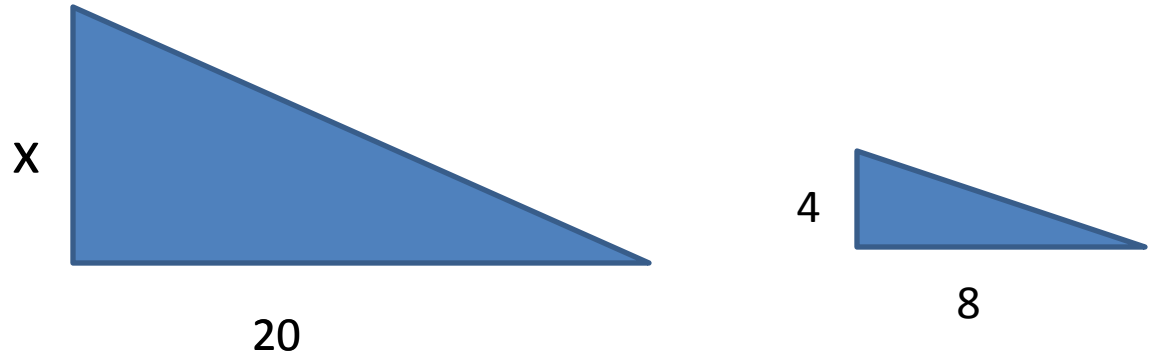


Multiply 4 x 20 (80)

$$\frac{x}{20} = \frac{4}{8}$$

Solving Proportions for Unknowns

Corresponding sides of similar triangles are proportional.



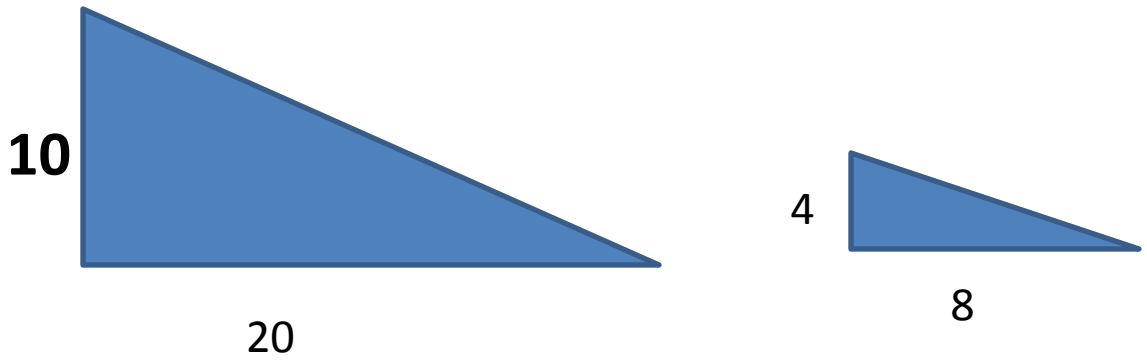
Multiply 4 x 20 (80)

Divide 80 by 8 Answer- 10

$$\frac{x}{20} = \frac{4}{8}$$

Solving Proportions for Unknowns

Corresponding sides of similar triangles are proportional.



Elements of a Percent Problem

- All percent problems have a “part”, and a “whole” that are in ratio to each other.

Elements of a Percent Problem

- **All percent problems have a "part", and a "whole" that are in ratio to each other.**

- **The "part" is in ratio to the "whole" in the same proportion as the percentage is in ratio to 100.**

Elements of a Percent Problem

- **All percent problems have a "part", and a "whole" that are in ratio to each other.**

- **The part is in ratio to the whole in the same proportion as the percent is in ratio to 100.**

- **This can be shown as:** $\frac{PART}{WHOLE} = \frac{\%}{100}$

Setting the problem up.

1st- Identify the part, the whole and the percent numbers in your problem. (One of these will be missing)

Setting the problem up.

1st-Identify the part, the whole and the percent numbers in your problem.

2nd-Fill in the numbers in this proportion format:

$$\frac{PART}{WHOLE} = \frac{\%}{100}$$

Setting the problem up.

1st-Identify the part, the whole and the percent numbers in your problem.

2nd-Fill in the numbers in this proportion format:

$$\frac{PART}{WHOLE} = \frac{\%}{100}$$

Hint: The word "of" comes before the whole.

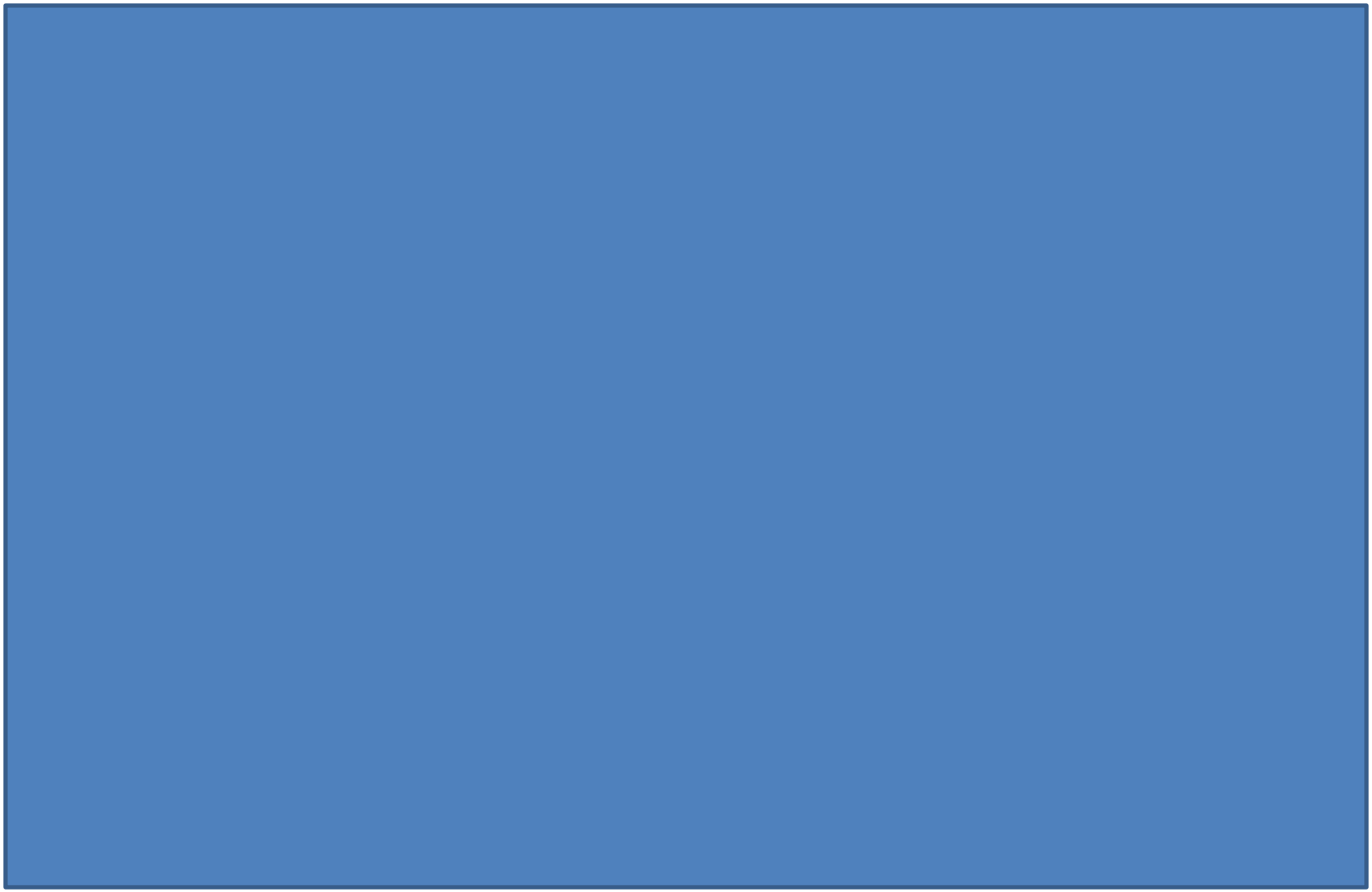
Solving the problem.

1st- Multiply the two numbers across from each other up and down.

2nd- Divide that answer by the third number.

$$\frac{PART}{WHOLE} = \frac{\%}{100}$$

For example- 40% of what number equals 220?



For example- 40% of what number equals 220?

1st -Identify the part, whole, and percent.

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2nd -Fill in the numbers in the proportion format

For example- 40% of what number equals 220?

1st -Identify the part, whole, and percent.

2nd -Fill in the numbers in the proportion format

3rd -Do the math.

For example- 40% of what number equals 220?

1st Identify the part, whole and percent.

Remember , the whole is after the word "of".

The whole is _____ The part is ____ The percent is ____

1st -Identify the part, whole, and percent.
2nd -Fill in the numbers in the proportion format
3rd -Do the math.

For example- 40% of <u>what number</u> equals 220?

1st Identify the part, whole and percent.

Remember , the whole is after the word "of".

The whole is <u>unknown</u> (what) The part is ____ The percent is ____

1st -Identify the part, whole, and percent.
2nd -Fill in the numbers in the proportion format
3rd -Do the math.

For example- 40% of what number equals 220?

1st Identify the part, whole and percent.

Remember , the whole is after the word "of".

The whole is unknown (what) The part is 220 The percent is ____

1st -Identify the part, whole, and percent.
2nd -Fill in the numbers in the proportion format
3rd -Do the math.

For example- 40% of what number equals 220?

1st Identify the part, whole and percent.

Remember , the whole is after the word "of".

The whole is unknown (what) The part is 220 The percent is 40%

1st -Identify the part, whole, and percent.
2nd -Fill in the numbers in the proportion format
3rd -Do the math.

For example- 40% of what number equals 220?

1st Identify the part, whole and percent.

Remember , the whole is after the word "of".

The whole is unknown (what) The part is 220_ The percent is 40%_

2nd Fill in the correct numbers in this format-

$$\frac{PART}{WHOLE} = \frac{\%}{100}$$ **becomes**

1st -Identify the part, whole, and percent.
2nd -Fill in the numbers in the proportion format
3rd -Do the math.

For example- 40% of what number equals 220?

1st Identify the part, whole and percent.

Remember , the whole is after the word "of".

The whole is unknown (what) The part is 220_ The percent is 40%_

2nd Fill in the correct numbers in this format-

$$\frac{PART}{WHOLE} = \frac{\%}{100} \textbf{ becomes } \frac{220}{x} = \frac{40}{100}$$

1st -Identify the part, whole, and percent.

2nd -Fill in the numbers in the proportion format

3rd -Do the math.

For example- 40% of what number equals 220?

1st Identify the part, whole and percent.

Remember , the whole is after the word "of".

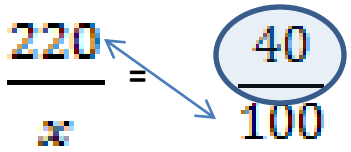
The whole is unknown (what) The part is 220_ The percent is 40%_

2nd Fill in the correct numbers in this format-

$$\frac{PART}{WHOLE} = \frac{\%}{100} \text{ becomes } \frac{220}{x} = \frac{40}{100}$$

3rd Solve the problem.

Multiply the two numbers across from each other up and down, then divide by the other number.



220 times 100 (22000) divided by 40 equals 550

So 40% of 550 equals 220.

This Method Always Works!

- Once you master this method it can be used to solve ANY type of percent problem.

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- Once you master this method it can be used to solve ANY type of percent problem.
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- In any percent problem you are comparing two quantities to each other in the same proportion as a percent which is comparing a number (the %) to 100.

This Method Always Works!

- Once you master this method it can be used to solve ANY type of percent problem.
- Best of all it makes sense.
- In any percent problem you are comparing two quantities to each other in the same proportion as a percent which is comparing a number (the %) to 100.

- Just remember-
- Copy this- $\frac{part}{whole} = \frac{\%}{100}$

Step-by-step: Identify the part, whole, and %

- 30 is what percent of 600?

What is missing? _____

Step-by-step: Identify the part, whole, and %

- 30 is what percent of 600?

What is missing? _____

- Answer: The PERCENT is missing.
- Now set it up-

Step-by-step: Set it up

- 30 is what % of 600?
- What is the format?

Step-by-step: Set It Up

- 30 is what % of 600?
- What is the format?
- $\frac{part}{whole} = \frac{\%}{100}$

Step-by-step: Set It Up

- 30 is what % of 600?
- What is the format?
- $\frac{part}{whole} = \frac{\%}{100}$
- Fill in the numbers-

Step-by-step: Set It Up

- 30 is what % of 600?
- What is the format?
- $\frac{part}{whole} = \frac{\%}{100}$
- Fill in the numbers-
- $\frac{30}{600} = \frac{\%}{100}$

Step-by-step: Do the math

- 30 is what % of 600?
- What is the format?
- $\frac{part}{whole} = \frac{\%}{100}$
- Fill in the numbers-
- $\frac{30}{600} = \frac{\%}{100}$
- What do we multiply?

Step-by-step: Do the math

- 30 is what % of 600?
- What is the format?
- $\frac{part}{whole} = \frac{\%}{100}$
- Fill in the numbers-
- $\frac{30}{600} = \frac{\%}{100}$
- What do we multiply?
- 30 times 100, then . . .

Step-by-step: Do the math

- 30 is what % of 600?
- What is the format?
- $\frac{part}{whole} = \frac{\%}{100}$
- Fill in the numbers-
- $\frac{30}{600} = \frac{\%}{100}$
- What do we multiply?
- 30 times 100, then . . . Divide by 600

Step-by-step: Do the math

- 30 is what % of 600?
- What is the format?
- $\frac{part}{whole} = \frac{\%}{100}$
- Fill in the numbers-
- $\frac{30}{600} = \frac{\%}{100}$
- What do we multiply?
- 30 times 100, then . . . Divide by 600
- So 30 is **5** % of 600.

Try this one now-
Step-by-step

- 15 % of _____ is 450

Step-by-step: Identify the part, whole, and %

- 15 % of _____ is 450
- Do you remember the format-

Step-by-step: Identify the part, whole, and %

- **15 % of _____ is 450**
- **Do you remember the format-**

$$\frac{\text{Part}}{\text{Whole}} = \frac{\%}{100}$$

Step-by-step: Identify the part, whole, and %

- **15 % of _____ is 450**
- **Format-**

$$\frac{\text{Part}}{\text{Whole}} = \frac{\%}{100}$$

What is missing? **A) PART B) WHOLE C) PERCENT**

Click your answer A, B, or C now.

Step-by-step: Identify the part, whole, and %

- **15 % of _____ is 450**
- **Format-**

$$\frac{\text{Part}}{\text{Whole}} = \frac{\%}{100}$$

What is missing? A) PART **B) WHOLE** C) PERCENT

Step-by-step: Identify the part, whole, and %

- 15 % of _____ is 450
- Format-

$$\frac{\text{Part}}{\text{Whole}} = \frac{\%}{100}$$

What is missing? A) PART B) WHOLE C) PERCENT

How do we know the whole is missing?

Step-by-step: Identify the part, whole, and %

- 15 % of _____ is 450
- Format-

$$\frac{\text{Part}}{\text{Whole}} = \frac{\%}{100}$$

What is missing? A) PART B) WHOLE C) PERCENT

How do we know the whole is missing?

The KEYWORD "OF" comes just before the whole.

Step-by-step: Set it up

- 15 % of _____ is 450
- Fill in the numbers-

$$\frac{\text{Part}}{\text{Whole}} = \frac{\%}{100}$$

Step-by-step: Do the math

- 15 % of _____ is 450
- Fill in the numbers- then **do the math.**

$$\frac{450}{X \text{ (whole)}} = \frac{15\ \%}{100}$$

Step-by-step: Do the math

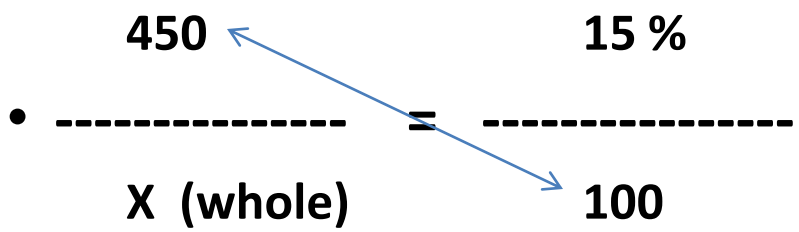
- 15 % of _____ is 450
- Fill in the numbers- then do the math.

$$\frac{450}{X \text{ (whole)}} = \frac{15\ \%}{100}$$

What two numbers do we multiply?

Step-by-step: Do the math

- **15 % of _____ is 450**
- **Fill in the numbers- then do the math.**



What two numbers do we multiply? **450 x 100**

What do we do after that?

Step-by-step: Do the math

- **15 % of _____ is 450**
- **Fill in the numbers- then do the math.**

$$\frac{450}{X \text{ (whole)}} = \frac{15\ \%}{100}$$

What two numbers do we multiply? **450 x 100**

What do we do after that? **Divide by 15**

Step-by-step: Do the math

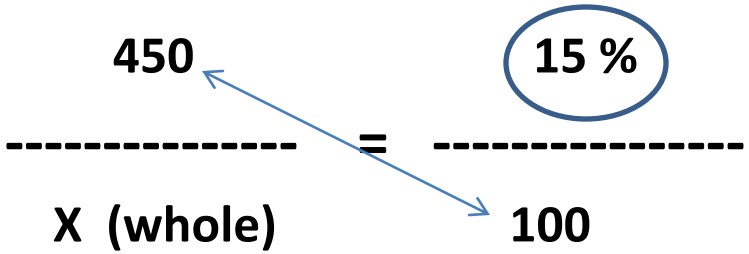
- 15 % of _____ is 450

- The answer is: A) 67.5 B) 300 C) 3000

Step-by-step: Do the math

- 15 % of _____ is 450

- **The answer is: A) 67.5 B) 300 C) 3000**



Multiply 450 x 100 (45000), then divide by 15.

PROBLEMS

1) 5% of ___ = 6

A) .3 B) 30 C) 120

PROBLEMS

1) 5% of ___ = 6

A) .3 B) 30 C) 120

- Part / Whole = % / 100

- 6 / Whole = 5 % / 100

Multiply 6 x 100 = 600

Divide 600 by 5 = 30

PROBLEMS

2) 31% of _____ = 620

A) 192.2 B) 2000 C) 20000

PROBLEMS

2) 31% of _____ = 620

A) 192.2 B) 2000 C) 20000

- Part / Whole = % / 100

- 620 / Whole = 31% / 100

Multiply 620 x 100 = 62000

Divide 62000 by 31 = 2000

PROBLEMS

3) ___% of 700 = 210

A) 333.33 B) 30 C) 3

PROBLEMS

3) ___% of 700 = 210

A) 333.33 B) 30 C) 3

- Part / Whole = % / 100

- 210 / 700 = ? % / 100 Multiply 210 x 100 = 21000 Divide 21000 by 700 = 30

PROBLEMS

- 4) __ % of 400 = 20

  A) 5 B) 200 C) 2000

PROBLEMS

- 4) __ % of 400 = 20

A) 5 B) 200 C) 2000

- Part / Whole = % / 100
- 20 / 400 = % / 100

Multiply 20 x 100 = 2000

Divide 2000 by 400 = 5

PROBLEMS

- 5) ____% of 250 = 100

  A) 250 B) 25 C) 40

PROBLEMS

- 5) ____% of 250 = 100

  A) 250 B) 25 C) 40

Part %

- ---------- = ----------

Whole 100

100 ? %

- ---------- = ---------- Multiply 100 x 100 = 10000

250 100 Divide 10000 by 250 = 40

PROBLEMS

6) 14% of 50 = ___

A) 7 B) 70 C) 357.14

PROBLEMS

6) 14% of 50 = **7**

A) 7 B) 70 C) 357.14

- Part / Whole = % / 100

- Part / 50 = 14 % / 100

Multiply 14 x 50 = 700

Divide 700 by 100 = 7

Now try these-

- 1) 10% of what equals 40?
- 2) 5 is what % of 50 ?
- 3) 15% of what number equals 9?
- 4) 25% of what number equals 30?
- 5) 20 is what % of 500 =
- 6) 36 is what % of 120 =
- 7) 21% of 400 =
- Click to check your answers.

Answers

1) 10% of **400** equals 40?

- 2) 5 is [redacted]% of 50 ?
- 3) 15% of [redacted] equals 9?
- 4) 25% of [redacted] equals 30?
- 5) 20 is [redacted]% of 500 =
- 6) 36 is [redacted]% of 120 =
- 7) 21% of 400 = [redacted]
- .

Answers

1) 10% of **400** equals 40?

- 2) 5 is **10** % of 50 ?
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Answers

1) 10% of **400** equals 40?

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- .

Answers

1) 10% of **400** equals 40?

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- .

Answers

1) 10% of **400** equals 40?

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- 5) 20 is **4**% of 500 =
- 6) 36 is [redacted]% of 120 =
- 7) 21% of 400 = [redacted]
- .

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1) 10% of **400** equals 40?

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- .

Answers

1) 10% of **400** equals 40?

- 2) 5 is **10** % of 50 ?
- 3) 15% of **60** equals 9?
- 4) 25% of **120** equals 30?
- 5) 20 is **4**% of 500 =
- 6) 36 is **30**% of 120 =
- 7) 21% of 400 = **84**
- .

Worksheets

Visit MyGEDClass.com for links to worksheets, videos and websites on percents. Click on GED Resources.

Relax

- During your GED Tests just relax. Most of the math problems will be multiple choice.

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- You do percents at the store already when you “guess-timate” the sales price of an item on sale for 30% off or something.

Relax

- During your GED Tests just relax.
- Most of the math problems will be multiple choice.

- You do percents at the store already when you "guess-timate" the sales price of an item on sale for 30% off or something.

- Use those same skills to help you pick a **reasonable** answer if you 'forget' how to do a problem.

Guess-

- Circuit City's "Going Out of Business Sale" has everything on sale now for 60% off.
- That iPOD you had been looking at that normally sold for $300 will be about how much?
- .
- .
- .
- .
- .

Guess Smart!

- Circuit City's "Going Out of Business Sale" has everything on sale now for 60% off.
- That item you had been looking at that normally sold for $300 will be about how much?
- A. $ 480
- B. $ 180
- C. $ 120
- D. $ 18
- 1st-Eliminate the unreasonable choices,
- then think or guess smart if you get stuck.

Workshops this week-

- Tuesday, March 17, 2009: Reading 101 - 11:15am and 9:15pm
- https://sas.elluminate.com/m.jnlp?sid=613&password=M.653D55F283174376BB1D5DEDEEB09A
-
-
- Wednesday, March 18, 2009: Technology - Digital Citizenship (Part 2) - 11:15am and 9:15pm
- https://sas.elluminate.com/m.jnlp?sid=613&password=M.653D55F283174376BB1D5DEDEEB09A
-
-
- Friday, March 20, 2009: Encore Presentation - Math (Percents) - 11:15am only
- http://elluminate.pinellas.k12.fl.us/join_meeting.html?meetingId=1228419924321
- (No password needed! Leave this part blank!)

www.MyGEDClass.com

Brett Taylor

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