

# Reasoning and Problem Solving

## Step 21: Percentages – Missing Values

### National Curriculum Objectives:

Mathematics Year 6: (6R2) [Solve problems involving the calculation of percentages \[for example, of measures, and such as 15% of 360\] and the use of percentages for comparison](#)

Mathematics Year 6: (6F11) [Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts](#)

### Differentiation:

Questions 1, 4 and 7 (Reasoning)

**Developing** Compare two statements finding percentages and explain why one is correct. Percentages are multiples of 10 and solutions are whole numbers.

**Expected** Compare two statements finding percentages and explain why one is correct. Percentages are multiples of 2 and 5, and solutions may have one decimal place.

**Greater Depth** Compare two statements finding any percentage and explain why one is correct. Solutions may have one decimal place.

Questions 2, 5 and 8 (Problem Solving)

**Developing** Complete a cross puzzle by finding the missing values. Percentages are multiples of 10.

**Expected** Complete a cross puzzle by finding two possible solutions for the missing values. Percentages are multiples of 2 and 5.

**Greater Depth** Complete a cross puzzle by finding two possible solutions for the missing values.

Questions 3, 6 and 9 (Problem Solving)

**Developing** Solve a one-step word problem by finding the missing value. Percentages are multiples of 10 and a bar model is provided.

**Expected** Solve a two-step word problem by finding the missing value. Percentages are multiples of 2 and 5, and a bar model is provided.

**Greater Depth** Solve a multi-step word problem by finding the missing values.

More [Year 5 and Year 6 Decimals and Percentages](#) resources.

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## Percentages – Missing Values

1a. The children disagree about how to find 20% of 60.



Olivia

20 is a third of sixty, so 20% of sixty must be 3.



Lucas

Divide 60 by 10 to find 10% and double that to find 20%. The answer is 12.

★ Who do you agree with and why?

6 R

## Percentages – Missing Values

1b. The children disagree about how to find 30% of 400.



Fionn

$400 - 30 = 370$  so 30% of 400 must be 370.



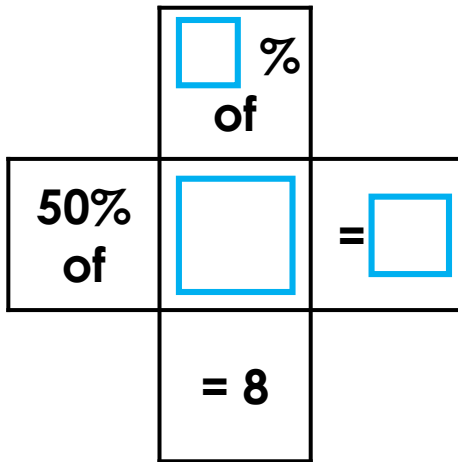
Amelie

Divide 400 by 10 to find 10% and then multiply by 3. The answer is 120.

★ Who do you agree with and why?

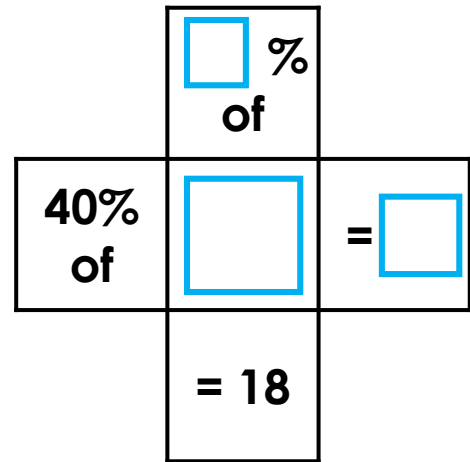
6 R

2a. What could the missing values be?



6 PS

2b. What could the missing values be?



6 PS

3a. 20% of the sweets in a jar are orange, the rest are yellow.

There are 240 sweets in the jar.

How many of the sweets are yellow?

100%	
?	20%



6 PS

3b. 30% of the cupcakes baked for a charity sale are red, the rest are lilac.

There are 300 cupcakes altogether.

How many of the cakes are covered with lilac icing?

100%	
?	30%



6 PS

# Percentages – Missing Values

# Percentages – Missing Values

4a. The children disagree about how to find 22% of 500.



Lucie

22% is 110 because 22% of 100 is 22 and 22% of 500 is five times this.



Marcus

10% of 500 is 50, so 22% must be 72.

★ Who do you agree with and why?

6 R

4b. The children disagree about how to find 48% of 300.



Annie

50% of 300 is 150, so 48% must be 148.



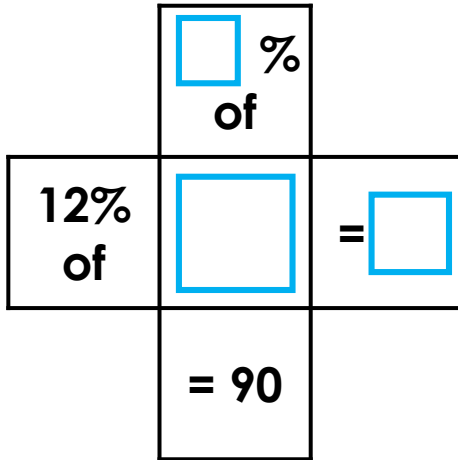
Stephan

10% is 30, so 40% must be  $30 \times 4$ . 1% is 3, so 8% must be  $8 \times 3$ . The answer is 144.

★ Who do you agree with and why?

6 R

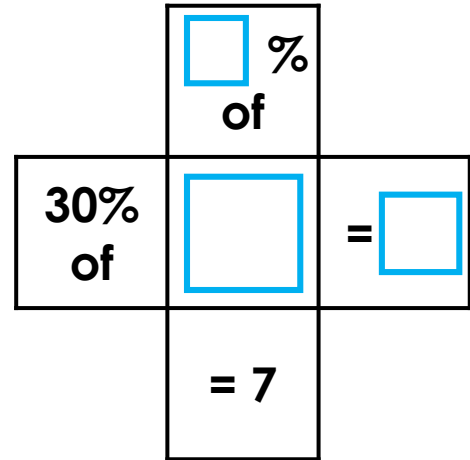
5a. What could the missing values be?



★ Find 2 possible solutions.

6 PS

5b. What could the missing values be?



★ Find 2 possible solutions.

6 PS

6a. A garden centre has 200 plants.

85% of the plants are roses. 60% of the roses are red, and the rest are yellow.

How many yellow roses are there?

85% of 200	
60%	?



6 PS

6b. A pizza shop sells 160 pizzas.

75% of the pizzas are topped with pepperoni. 35% of the pepperoni pizzas are stuffed crust, and the rest are not.

How many pizzas do not have stuffed crust?

75% of 160	
?	35%



6 PS

## Percentages – Missing Values

## Percentages – Missing Values

7a. The children disagree about how to find 33% of 140.



Tia

10% of 140 is 14 and 1% of 140 is 1.4. If I multiply both by 3, I can find the answer.



Joe

I can find 77% of 140 and subtract that from 140 to find the answer.



Who do you agree with and why?

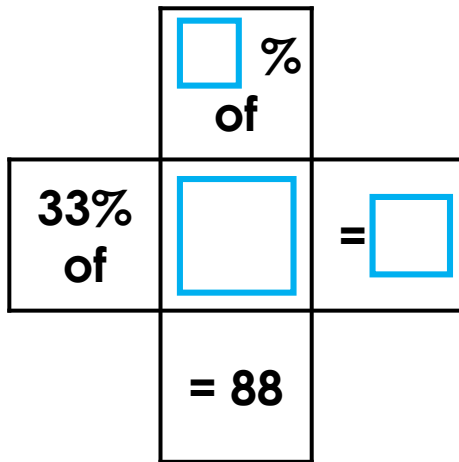
6 R



Who do you agree with and why?

6 R

8a. What could the missing values be?

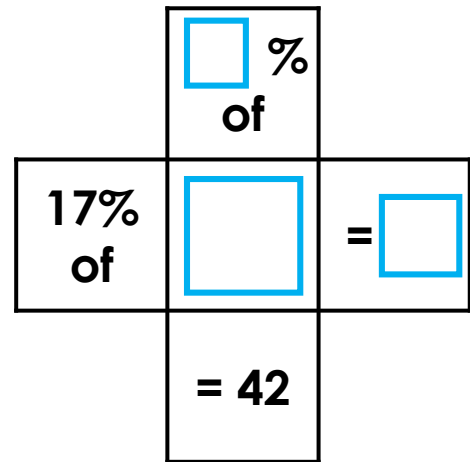


Find 2 possible solutions.

6 PS



8b. What could the missing values be?



Find 2 possible solutions.

6 PS

9a. There are 200 children in year seven.

90% are going on the school adventure camp.

While on camp 75% of the children take part in the high wire obstacle course, and 80% of those who take part complete the full course.

How many children went on the high wire and how many completed the course?



6 PS

9b. 250 plants are grown in an allotment.

80% of the plants are edible.

Of the 80%, 37% are fruits and the rest are vegetables.

How many plants are fruits and how many are vegetables?



6 PS

## Reasoning and Problem Solving Percentages – Missing Values

### Developing

- 1a. Lucas is correct; Olivia's method does not find 20%.  
2a. Various possible answers, for example:  
 $50\%$  of  $40 = 20$  and  $20\%$  of  $40 = 8$   
3a. 192 sweets

### Expected

- 4a. Lucie is correct; Marcus has added 22 to 10%.  
5a. Various possible answers, for example:  
 $12\%$  of  $180 = 21.6$  and  $50\%$  of  $180 = 90$ ;  
 $12\%$  of  $360 = 43.2$  and  $25\%$  of  $360 = 90$   
6a. 68 roses

### Greater Depth

- 7a. Either method could be used.  
Children's answers may vary dependent on their chosen method.  
8a. Various possible answers, for example:  
 $33\%$  of  $100 = 33$  and  $88\%$  of  $100 = 88$ ;  
 $33\%$  of  $160 = 52.8$  and  $55\%$  of  $160 = 88$   
9a. 135 children went on the high wire and 108 completed the course.

## Reasoning and Problem Solving Percentages – Missing Values

### Developing

- 1b. Amelie is correct; Lucas' method does not find 30%.  
2b. Various possible answers, for example:  
 $40\%$  of  $90 = 36$  and  $20\%$  of  $90 = 18$   
3b. 210 cakes

### Expected

- 4b. Stephan is correct; Annie has taken 2 (instead of 2%) away from 50%.  
5b. Various possible answers, for example:  
 $30\%$  of  $70 = 21$  and  $10\%$  of  $70 = 7$ ;  
 $30\%$  of  $35 = 10.5$  and  $20\%$  of  $35 = 7$   
6b. 78 pizzas

### Greater Depth

- 7b. Either method could be used.  
Children's answers may vary dependent on their chosen method.  
8b. Various possible answers, for example:  
 $17\%$  of  $100 = 17$  and  $42\%$  of  $100 = 42$ ;  
 $17\%$  of  $150 = 25.5$  and  $28\%$  of  $150 = 42$   
9b. 74 of the plants are fruit and 126 are vegetables.