Reasoning and Problem Solving
Step 5: Formulae

National Curriculum Objectives:

Mathematics Year 6: (6A1) Express missing number problems algebraically
Mathematics Year 6: (6A2) Use simple formulae
Mathematics Year 6: (6A4) Find pairs of numbers that satisfy an equation with two unknowns
Mathematics Year 6: (6A5) Enumerate possibilities of combinations of two variables

Differentiation:

Questions 1, 4 and 7 (Problem Solving)
Developing Find the missing value using the given formula. Using all four operations with whole numbers. Some pictorials for support.
Expected Find the missing value using the given formula. Using all 4 operations with some decimals and fractions. Children use order of operations knowledge.
Greater Depth Find the missing value using the given formula. Using all 4 operations with fractions, percentages, whole and decimal numbers. Children use order of operations knowledge.

Questions 2, 5 and 8 (Reasoning)
Developing Use a formula to explain whether the given statement is correct. Using all four operations with whole numbers. Some pictorials for support.
Expected Use a formula to explain whether the given statement is correct. Using all 4 operations with some decimals and fractions. Children use order of operations knowledge.
Greater Depth Use a formula to explain whether the given statement is correct. Using all 4 operations with fractions, percentages, whole and decimal numbers. Children use order of operations knowledge.

Questions 3, 6 and 9 (Reasoning)
Developing Explain which formula is correct from a choice of two. Using all four operations with whole numbers. Some pictorials for support.
Expected Explain which two formulae are correct from a choice of three. Using all 4 operations with some decimals and fractions. Children use order of operations knowledge.
Greater Depth Explain which two formulae are correct from a choice of three. Using all 4 operations with fractions, percentages, whole and decimal numbers. Children use order of operations knowledge.

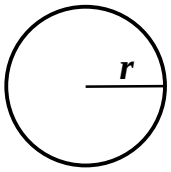
More Year 6 Algebra resources.

Did you like this resource? Don't forget to review it on our website.

Formulae

1a. Jordan is calculating the radius of a circle.

He is using the formula $d = 2r$.



He calculates that $d = 20$cm.

What is the value of r?

D

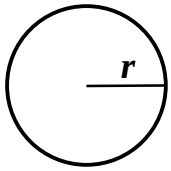
Not to scale

PS

Formulae

1b. Millie is calculating the diameter of a circle.

She is using the formula $d = 2r$.



She calculates that $r = 8$cm.

What is the value of d?

D

Not to scale

PS

2a. Here is a formula for the amount of flour (f) needed to bake brownies.

$$f = c \times 2$$

Hamish has 2 bars of chocolate (c) and 3 bags of flour.

Does Hamish have enough flour? Convince me.

D

R

2b. Here is a formula for the number of tulips (t) planted for every rose (r).

$$r = 3t$$

Maud plants 2 roses; she has planted 5 tulips.

Has she planted enough tulips? Convince me.

D

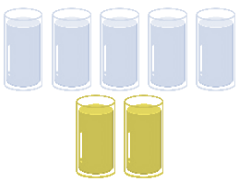
R

3a. Cleaning fluid (c) is made up of 5 cups of water (w) and 2 cups of bleach (b).

Which formula represents this?

A. $c = 5w + 2b$

B. $c = 5 + w + 2 + b$



Explain how you know.

D

R

3b. Tomato feed (t) is made up of 6 cups of water (w) and 1 cup of plant food (p).

Which formula represents this?

A. $t = 1w + 6p$

B. $t = 6w + 1p$

Explain how you know.

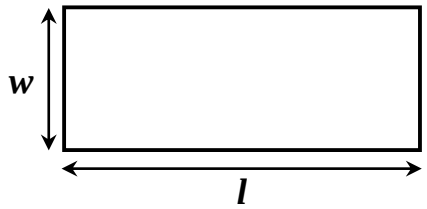
D

R

Formulae

4a. Jaiden is calculating the perimeter of a rectangle.

He is using the formula $p = 2w + 2l$.



When l = 6.5cm, he calculates that p = 19cm.
What is the value of w?

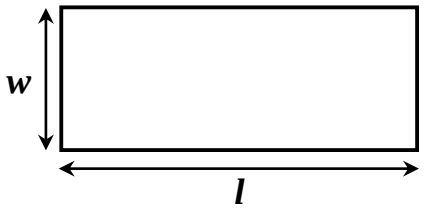
E

Not to scale

PS

4b. Sophia is calculating the area of a rectangle.

She is using the formula $a = w \times l$.



When l = 12cm, she calculates that a = 60cm^2.
What is the value of w?

E

Not to scale

PS

5a. Here is a formula for the amount of paint needed (p) to paint a wall.

$$p = w \times 50\text{ml}$$

A wall is 13m wide (w). Deni has 650ml of paint.

Does Deni have enough paint?
Convince me.

E

R

5b. Here is a formula for the amount of pet food (f) needed over 2 weeks.

$$f = w \times m$$

A puppy weighs 6kg (w) and is 8 months old (m). His owner has bought 40kg of food to use for the next 2 weeks.

Does his owner have enough pet food?
Convince me.

E

R

6a. The formula for calculating speed (s) is distance (d) divided by time (t).

Which two formulae represent this?

A. $s = d \div t$

B. $s = t \div d$

C. $s = \frac{d}{t}$

Explain how you know.

E

R

6b. The area of a triangle (a) is calculated using base (b) multiplied by height (h), divided by 2.

Which two formulae represent this?

A. $a = 2 \div b \times h$

B. $a = (b \times h) \div 2$

C. $a = \frac{(b \times h)}{2}$

Explain how you know.

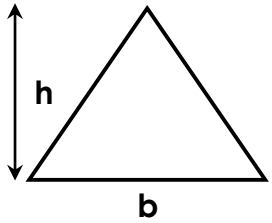
E

R

Formulae

7a. Yusuf is calculating the area of a triangle.

He is using the formula $a = \frac{1}{2} b \times h$.



When b = 12cm, he calculates that a = 66cm^2.

What is the value of h?

GD

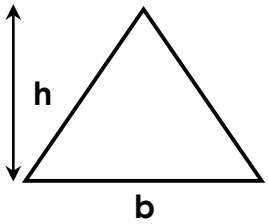
Not to scale

PS

Formulae

7b. Jade is calculating the area of a triangle.

She is using the formula $a = \frac{1}{2} b \times h$.



When h = 12cm, she calculates that a = 132cm^2.

What is the value of b?

GD

Not to scale

PS

8a. Here is a formula for the minimum amount of exercise in minutes (e) that a puppy needs each day.

$$e = \frac{(w \times a)}{2}$$

A puppy weighs 8kg (w) and is 16 months old (a). Her owner plans to walk her for half an hour each day.

Is this enough? Convince me.

GD

R

8b. Here is a formula for the amount of paving slabs needed to create a patio with a step (p).

$$p = (l \times w) \times 5$$

The patio is 2.5m in length (l) and 4m in width (w). Katie buys 58 paving slabs.

Does she have enough? Convince me.

GD

R

9a. The height to set a desk (d) for optimum working conditions is half a person's height (h) then subtract 30.5cm.

Which two formulae represent this?

A. $d = (h \div 2) - 30.5$

B. $d = \frac{h - 30.5}{2}$

C. $d = \frac{h}{2} - 30.5$

Explain how you know.

GD

R

9b. To make chocolate milk (c), you need 5 cups of milk (m) and a bar of chocolate (n) halved.

Which two formulae represent this?

A. $c = 5m + n \div 2$

B. $c = 5m + (n \div 2)$

C. $c = \frac{n + 5m}{2}$

Explain how you know.

GD

R

Reasoning and Problem Solving Formulae

Developing

1a. 10cm

2a. Various answers, for example:
No; he would need to have 4 bags of flour in order to have enough, because 2 x 2 = 4.

3a. A. This shows 5 lots of water and2 lots of bleach, which matches the formula.

Expected

4a. 3cm

5a. Various answers, for example:
Yes; she has 650ml, which is how much she needs in order to paint the wall. This is because 50 x 13 = 650.

6a. A and C. B shows time being divided by distance, which is incorrect.

Greater Depth

7a. 11cm

8a. Various answers, for example:
No; the puppy needs at least 64 minutes of exercise each day, because 8 x 16 = 128; 128 ÷ 2 = 64.

9a. A and C. B shows everything being divided by 2, which will result in the incorrect height of the desk.

Reasoning and Problem Solving Formulae

Developing

1b. 16cm

2b. Various answers, for example:
No; she needs to plant another tulip in order to have planted enough, because there are 2 roses, so there should be 6 tulips.

3b. B. This shows 6 lots of water and 1 lot of plant food, which matches the formula.

Expected

4b. 5cm

5b. Various answers, for example:
No; the owner is planning to feed the puppy 40kg of food, but he still needs another 8kg to have enough. This is because 8 x 6 = 48.

6b. B and C. A shows 2 being divided by base x height, which is incorrect.

Greater Depth

7b. 11cm

8b. Various answers, for example:
Yes; she needs 50 paving slabs in order to create the patio, because 2.5 x 4 = 10; 10 x 5 = 50.

9b. A and B. C shows both milk and chocolate being halved, which will result in the incorrect amount of milk and chocolate.