



Equations with fractions

Year 8 About 70 minutes No calculator 50 marks

Date _____

A Do Now

Quick questions to start.

- A1** Needed today [1 mark]

Solve $\frac{x}{4} = 7$.

A2 Needed today [1 mark]

Solve $3(x - 2) = 15$.

Answer

Answer

- A3** Last lesson [1 mark]

Factorise $6ab + 15a$ as much as possible.

A4 Year 7 [1 mark]

Write $\frac{12}{30}$ in its simplest form.

Answer

Answer

B Example, then your turn

Year 8

When x is on the bottom of a fraction, multiply both sides by the bottom first. A bracket on the bottom stays a bracket: multiply by all of it. Then solve as usual, and check by putting your answer back in. Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Solve $\frac{18}{x} = 4$.

Hint Multiply both sides by x .

B1 Solve (i) $\frac{35}{x} = 7$ (ii) $\frac{21}{x} = 6$. [2 marks]

Answer (i) $x = \dots\dots$ (ii) $x = \dots\dots$

EXAMPLE 2

Solve $\frac{15}{4x} = 3$.

Hint Multiply both sides by $4x$: $15 = 12x$.

B2 Solve (i) $\frac{21}{2x} = 6$ (ii) $\frac{8}{3x} = 4$. [2 marks]

Answer (i) $x = \dots\dots$ (ii) $x = \dots\dots$

EXAMPLE 3

Solve $\frac{36}{x+3} = 4$.

Hint Multiply both sides by $(x+3)$, or say "36 divided by what is 4?"

B3 Solve (i) $\frac{45}{x-4} = 9$ (ii) $\frac{28}{2x+1} = 4$. [2 marks]

Answer (i) $x = \dots\dots$ (ii) $x = \dots\dots$

EXAMPLE 4

Solve $\frac{x+4}{x-2} = 3$.

Hint Multiply both sides by $(x-2)$. Then you have x on both sides.

B4 Solve $\frac{2x+3}{x-1} = 3$. [3 marks]

Answer $x = \dots\dots$ **EXAMPLE 5**

N is a number. Three times N , divided by 2 less than N , equals 4. Write an equation and solve it to find N .

Hint "2 less than N " is $N - 2$, and it is the whole bottom of the fraction.

B5 x is a number. The ratio $x : (x + 6)$ is equal to $3 : 5$. Write an equation with fractions and solve it to find x . [3 marks]

Answer $x = \dots\dots$ **c Practice**

Year 8

C1 Solve $\frac{12}{x+7} = 3$. [2 marks]

Answer $x = \dots\dots$

C2 Solve $\frac{30}{10-x} = 6$. [2 marks]

Answer $x = \dots\dots$

C3 Kai says that $x = 2$ is the solution of $\frac{14}{3x-1} = 2$. Is Kai right? Show how you decide. [2 marks]

C4 Speed = distance $\div$ time. A train travels 210 km at an average speed of 56 km/h. Use the formula to write an equation for the time t hours, and solve it. [2 marks]

Answer $t = \dots\dots$ hours

C5 Solve $\frac{5}{2x} = \frac{1}{4}$. [2 marks]

Answer $x = \dots\dots$

C6 60 divided by a number is 4 more than 8. Write an equation and solve it to find the number. [2 marks]

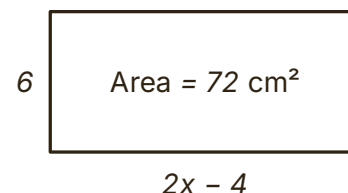
Answer

- D1** Ali solves $\frac{20}{x+3} = 4$. He writes $20 = 4x + 3$, and gets $x = 4.25$. [3 marks]
- Ali is wrong. Explain his mistake, and solve the equation correctly.

Answer $x = \dots\dots$

- D2** A rectangle is 6 cm wide and $(2x - 4)$ cm long. Its area is 72 cm^2 .

- (a) Explain why $\frac{72}{2x-4} = 6$. [1 mark]



- (b) Solve the equation to find x . [2 marks]

Not drawn accurately

Answer $x = \dots\dots$

- (c) Work out the perimeter of the rectangle. [2 marks]

Answer

Total for D2: 5 marks

- D3** Solve $\frac{8}{x+1} = \frac{6}{x-1}$. [3 marks]

Answer $x = \dots\dots$

- D4** A car travels 150 km at an average speed of $(x + 10)$ km/h. The journey takes 2.5 hours. Write an equation and solve it to find x . [3 marks]

Answer $x = \dots\dots$

D5 There are x numbers in a list. Their total is $4x + 18$. The mean of the numbers is 6.

(a) Write an equation in x .

[1 mark]

Answer

(b) Solve your equation to find how many numbers there are.

[2 marks]

Answer

(c) Check your answer by working out the total and the mean.

[1 mark]

Total for D5: 4 marks

E Extension

Stretch

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 The same whole number is added to the top and to the bottom of the fraction $\frac{3}{8}$. [4 marks]
The new fraction is equal to $\frac{2}{3}$. What number was added?

Answer

Extension hints

Cover these with paper. Uncover one at a time.

E1 **Hint 1** Call the number n . Write the new fraction with n in it.

Hint 2 $\frac{3+n}{8+n} = \frac{2}{3}$. Multiply both sides by $3(8+n)$.

Hint 3 $3(3+n) = 2(8+n)$, so $9+3n = 16+2n$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can solve an equation with x on the bottom of a fraction.

☐ ☐ ☐

I can solve an equation with a bracket on the bottom, or x on the top and the bottom.

☐ ☐ ☐

I can solve an equation with a fraction on each side by cross-multiplying.

☐ ☐ ☐

I can write and solve a fraction equation from words, a ratio or a formula.

☐ ☐ ☐