



Algebraic fractions

Year 8 About 70 minutes No calculator 48 marks

Date _____

A Do Now

Quick questions to start.

A1 Needed today [1 mark]

Work out $\frac{4}{9} + \frac{5}{6}$.

Answer

A2 Needed today [1 mark]

Expand $3(2x - 5)$.

Answer

A3 Last lesson [1 mark]

Work out $\frac{3}{8} \div \frac{9}{20}$.

Answer

A4 Year 7 [1 mark]

Simplify $4a + 3b - a + 2b$.

Answer

B Example, then your turn

Year 8

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Simplify (a) $\frac{6a}{9}$ (b) $\frac{8x + 12}{4}$.

Hint Divide the top and the bottom by the same number. In (b) every term on the top must be divided.

B1 Simplify (i) $\frac{10t}{15}$ (ii) $\frac{12y - 18}{6}$. [2 marks]

Answer (i) (ii)

EXAMPLE 2

Write $\frac{x}{3} + \frac{3x}{5}$ as a single fraction. Check your answer with $x = 15$.

Hint Use the common denominator 15, just as you would for $\frac{1}{3} + \frac{3}{5}$.

B2 Write $\frac{a}{4} + \frac{5a}{6}$ as a single fraction. [2 marks]

Answer

EXAMPLE 3

Write $\frac{x + 4}{3} + \frac{x - 2}{4}$ as a single fraction.

Hint Over 12, the first top is multiplied by 4 and the second by 3. Keep the brackets.

B3 Write $\frac{a + 2}{5} + \frac{a - 3}{2}$ as a single fraction. [3 marks]

Answer

EXAMPLE 4

Write $\frac{2x+5}{6} - \frac{x-1}{4}$ as a single fraction.

Hint The minus sign multiplies the whole second bracket: $-3(x-1) = -3x+3$.

B4 Write $\frac{3a+1}{4} - \frac{a-2}{3}$ as a single fraction. [3 marks]

Answer

EXAMPLE 5

Simplify (a) $\frac{4a}{9} \times \frac{3}{2a}$ (b) $\frac{3x}{5} \div \frac{x}{10}$.

Hint Multiply tops and bottoms, then cancel. To divide, multiply by the reciprocal.

B5 Simplify (i) $\frac{5y}{6} \times \frac{9}{10y}$ (ii) $\frac{2n}{3} \div \frac{4n}{9}$. [2 marks]

Answer (i) (ii)

C Practice

Year 8

C1 Write $\frac{5x-2}{7} + \frac{2x+9}{7}$ as simply as possible. [2 marks]

Answer

C2 Write $3 + \frac{x}{4}$ as a single fraction. [2 marks]

Answer

C3 Write $\frac{2a}{3} - \frac{b}{5}$ as a single fraction. [2 marks]

Answer

C4 Write $\frac{x}{2} + \frac{x}{3} + \frac{x}{6}$ as simply as possible. [2 marks]

Answer

C5 Simplify $\frac{10x-15}{20x+5}$ by dividing the top and the bottom by a common factor. [2 marks]

Answer

D1

Sam says: " $\frac{a}{3} + \frac{a}{5} = \frac{2a}{8}$."

Sam is wrong.

(a) Show that Sam is wrong by working out both sides when $a = 15$. [2 marks]

(b) Write $\frac{a}{3} + \frac{a}{5}$ correctly as a single fraction. [1 mark]

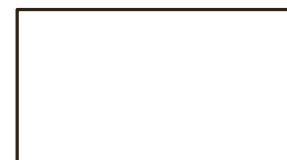
Answer

Total for D1: 3 marks

D2 The sides of a rectangle are $\frac{x+3}{2}$ cm and $\frac{x-1}{3}$ cm.

(a) Show that the perimeter is $\frac{5x+7}{3}$ cm. [3 marks]

$(x-1)/3$ cm



$(x+3)/2$ cm

Not drawn accurately

(b) The perimeter is 9 cm. Work out the value of x . [2 marks]

Answer

Total for D2: 5 marks

D3 Show that $\frac{x+1}{2} - \frac{x-1}{3}$ can be written as $\frac{x+5}{6}$. [3 marks]

D4 Solve $\frac{x+5}{3} + \frac{x-2}{4} = 7$. [4 marks]

Answer

- D5** A cyclist rides $\frac{5x}{4}$ km in $\frac{x}{6}$ hours. Show that her average speed is the same whatever the value of x , and work it out. [3 marks]

Answer

E Extension

Stretch

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

- E1** Write $\frac{x}{2} + \frac{x}{6} + \frac{x}{12} + \frac{x}{20}$ as a single fraction, as simply as possible. [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Find a common denominator. 60 is a multiple of 2, 6, 12 and 20.
- Hint 2** Over 60 the tops are $30x$, $10x$, $5x$ and $3x$.
- Hint 3** $\frac{48x}{60}$: divide the top and the bottom by 12.

How did it go?

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

- I can simplify an algebraic fraction by dividing by a common factor. ☐ ☐ ☐
- I can add and subtract algebraic fractions using a common denominator. ☐ ☐ ☐
- I can multiply and divide algebraic fractions, cancelling first. ☐ ☐ ☐
- I can check a single fraction by substituting a value. ☐ ☐ ☐