

Further Maths GCSE

Other Topics Answers

$$1. \quad 2\frac{2}{3} - 1\frac{3}{4} \div 1\frac{1}{8}$$

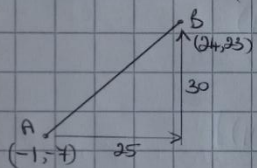
$$\frac{8}{3} - \frac{7}{4} \div \frac{9}{8}$$

Divide first $\frac{7}{4} \div \frac{9}{8} = \frac{7}{4} \times \frac{8}{9} = \frac{56}{36} = \frac{14}{9}$

then $\frac{8}{3} - \frac{14}{9} = \frac{8 \times 3 - 14 \times 3}{3 \times 9} = \frac{24 - 42}{27}$

$$= \frac{30}{27} = \frac{10}{9} = 1\frac{1}{9}$$

2. Vector $\vec{AB} = \begin{pmatrix} 25 \\ 30 \end{pmatrix}$



Point C is $\frac{2}{5}$ along AB
 so $\vec{AC} = \frac{2}{5} \begin{pmatrix} 25 \\ 30 \end{pmatrix} = \begin{pmatrix} 10 \\ 12 \end{pmatrix}$

so $C = (-1+10, -7+12) = (9, 5)$

3. $x^2 + 3x + 4 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

but $b^2 - 4ac = 9 - 16 = -7$

so to calculate x we would have $\frac{-3 \pm \sqrt{-7}}{2}$

but $\sqrt{-7}$ is not real

4. (i) $y^2 = 4x + 5$

(ii) $x + y = 4 \Rightarrow x = 4 - y$ substitute into (i)

$$y^2 = 4(4 - y) + 5$$

$$y^2 = 16 - 4y + 5$$

$$y^2 + 4y - 21 = 0$$

$$(y + 7)(y - 3) = 0$$

so $y = 3, x = 1$

or $y = -7, x = 11$

5. $(x+y)^2 + (x+y)(2x+5y)$

common factor $(x+y)$

$$= (x+y) [(x+y) + (2x+5y)]$$

$$= (x+y)(3x+6y)$$

$$= 3(x+y)(x+2y)$$

6. $(w+t)^3 - (w+t)^2(w+1)$

$$= (w+t)^2 [(w+t) - (w+1)]$$

$$= (w+t)^2 \times 3$$

$$= 3(w+t)^2$$

7. $\frac{(x+6)(x-2)}{(x-5)(x+5)} \div \frac{(x+6)}{x(x-5)}$

$$= \frac{(x+6)(x-2)}{(x+5)(x-5)} \times \frac{x(x-5)}{(x+6)} = \frac{x(x-2)}{(x+5)}$$

$$8. \frac{(4x-1)(x+5)}{(3x-4)(3x+4)} = \frac{(x+5)}{(3x-4)}$$

$$= \frac{\cancel{(4x-1)}(x+5)}{(3x-4)(3x+4)} \times \frac{\cancel{(3x-4)}}{(x+5)}$$

$$= \frac{(4x-1)}{(3x+4)}$$

$$9. \frac{x-1}{y-2} = 3 \Rightarrow x-1 = 3(y-2)$$

$$\Rightarrow x-1 = 3y-6$$

$$\Rightarrow x = 3y-5$$

$$\frac{x+6}{y-1} = 4 \Rightarrow x+6 = 4(y-1)$$

$$x = 4y-10$$

Therefore $3y-5 = 4y-10$

$$5 = y \quad \text{so } x = 10$$

$$10. \sqrt{12} : \sqrt{48} : \sqrt{300}$$

$$\sqrt{4}\sqrt{3} : \sqrt{16}\sqrt{3} : \sqrt{100}\sqrt{3}$$

$$2\sqrt{3} : 4\sqrt{3} : 10\sqrt{3}$$

$$2 : 4 : 10$$

$$1 : 2 : 5$$

$$11. x^{3/2} = 8$$

$$x = 8^{2/3} = 4$$

$$y^{-2} = \frac{25}{4}$$

$$y^2 = \frac{4}{25}$$

$$y = \frac{2}{5} \quad (\text{as } y > 0)$$

$$\text{so } \frac{x}{y} = \frac{4}{2/5} = \frac{20}{2} = 10$$

$$12. \sqrt{[33+\sqrt{x}]} = 6$$

$$33+\sqrt{x} = 36$$

$$\sqrt{x} = 3$$

$$x = 9$$

$$13. y(\sqrt{3}-1) = 8$$

$$y = \frac{8}{\sqrt{3}-1} = \frac{8 \times (\sqrt{3}+1)}{(\sqrt{3}-1)(\sqrt{3}+1)} = \frac{8\sqrt{3}+8}{2}$$

$$= 4\sqrt{3}+4$$

$$14. x^{-2/3} = 7/9$$

$$x^{-3/3} = \frac{64}{9}$$

$$x^{3/3} = \frac{9}{64}$$

$$x = \left(\frac{9}{64}\right)^{3/2} = \left(\frac{3}{8}\right)^3 = \frac{27}{512}$$

$$15. \quad x = 1.5t$$

$$y = 0.9w$$

$$\text{but } x = y \Rightarrow 1.5t = 0.9w$$

$$\frac{1.5t}{w} = 0.9$$

$$\frac{t}{w} = \frac{0.9}{1.5} = 0.6.$$

16.

$$\text{Vol of sphere} = \frac{4}{3}\pi x^3$$

$$\text{hemisphere} = \frac{2}{3}\pi y^3$$

$$\text{So } \frac{4}{3}\pi x^3 = \frac{2}{3}\pi y^3$$

$$2x^3 = y^3$$

$$2 = \frac{y^3}{x^3}$$

$$\text{so } 2^{1/3} = \frac{y}{x}.$$