

Proportion

Mark Scheme

Level	IGCSE
Subject	Maths
Exam Board	Edexcel
Topic	Equations, Formulae and Identities
Sub Topic	Proportion
Booklet	Mark Scheme

Time Allowed: 59 minutes

Score: /49

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	70%	60%	55%	50%	<50%

Question Number	Working	Answer	Mark	Notes
1. (a)	$P = kQ^3$		3	M1 for $P = kQ^3$ but not for $P = Q^3$
	$1350 = k \times 3375$			M1 for $1350 = k \times 3375$ Also award for $1350 = k \times 15^3$
		$P = 0.4Q^3$ oe		A1 $P = 0.4Q^3$ oe Award 3 marks if answer is $P = kQ^3$ oe but k is evaluated as 0.4 in part (a) or part (b)
(b)		3200	1	B1 ft from "0.4" $\times 8000$ except for $k = 1$, if at least M1 scored in (a) (at least 1 d.p. accuracy in follow through)
				Total 4 marks

2. (a)	$F = "k"/d^2$ $12 = k/2^2$ $k = 48$	$F = 48/d^2$	3	M1 $k =$ letter not number. M1 A1 Award 3 marks for $F = "k"/d^2$ and $k = 48$ stated anywhere, unless contradicted by later work.
(b)	$(F =) "48"/5^2$	1.92 oe	1	B1 ft $k \neq 1$ accept 48/25 as an answer.
(c)	$3 = "48"/d^2$ $d^2 = "48"/3$	4	2	$k \neq 1$ M1 Rearrangement to make d^2 or d the subject A1 ignore \pm
				Total 6 marks

3. (a)		$81a^8b^4$	2	B2 B1 for 81 B1 for a^8b^4
(b)		$3c^4$	2	B2 B1 for 3 B1 for c^4
				Total 4 marks

4.	(a)	$t = kf^2$		3	M1 for $t = kf^2$ but not for $t = f^2$ Also award for correct equation in t, f^2 and a constant or for $t =$ some numerical value $\times f^2$
		$0.02 = k \times 8^2$ or $k = \frac{1}{3200}$ or $k = 0.0003125$ or 3.125×10^{-4}			M1 for $0.02 = k \times 8^2$ or for correct substitution into an equation which scores the first method mark (may be implied by correct evaluation of the constant)
			$t = 0.0003125f^2$ or $t = \frac{1}{3200}f^2$		A1 Award 3 marks if answer is $t = kf^2$ but k is evaluated in part (b)
	(b)	$f^2 = \frac{0.0098}{0.0003125}$ or $f^2 = \frac{0.0098}{0.02} \times 8^2$		2	M1 for substitution and rearrangement into form $f^2 = \frac{0.0098}{k}$ with their value of k except for $k = 1$ or $f^2 = \frac{0.0098}{0.02} \times 8^2$
			5.6 oe		A1
Total 5 marks					

5.	(a)	$y = kx^3$ or $ky = x^3$		3	M1 for $y = kx^3$ but not for $y = x^3$
		$250 = 1000k$			M1 for $250 = 1000k$ Also award for $250 = k \times 10^3$
			$y = \frac{1}{4}x^3$ oe		A1 for $y = \frac{1}{4}x^3$ oe Award 3 marks if answer is $y = kx^3$ and k is evaluated as $\frac{1}{4}$ oe in part (a) or part (b)
	(b)	$54 = \frac{1}{4}x^3$		2	M1 dep on at least first M1 in part (a)
				6	A1 ft from $x^3 = 54 \div \frac{1}{4}$ oe
Total 5 marks					

Question	Working	Answer	Mark	Notes
6. (a)	$D = kt^2$		3	M1 for $D = kt^2$ but not for $D = t^2$
	$8 = k \times 16$ oe or $8 = k \times 4^2$			M1
		$D = \frac{1}{2}t^2$		A1 for $D = \frac{1}{2}t^2$ oe with D the subject Award 3 marks if answer is $D = kt^2$ and k is evaluated as $\frac{1}{2}$ in part (a) or part (b)
(b)	$t^2 = 100$		2	M1
		10		A1 Also accept ± 10
				Total 5 marks

7. (a)	$v = k\sqrt{x}$ oe		3	M1
	$8 = k\sqrt{25}$ oe			M1
		$v = 1.6\sqrt{x}$ oe		A1 Allow $v = k\sqrt{x}$ if $k = 1.6$ is found in (a) or (b).
(b)	$(v =) "1.6" \sqrt{56.25}$		2	M1ft Do not ft if $k = 1$
		12		A1 cao
				Total 5 marks

Question	Working	Answer	Mark	Notes
8. (a)	$F = \frac{k}{x^2}$			M1 k must be a letter not a number
	$0.8 = \frac{k}{5^2}$ or $k = 20$			M1 for substitution (implies first M1)
		$F = \frac{20}{x^2}$	3	A1 Award 3 marks for $F = \frac{k}{x^2}$ and $k = 20$ stated anywhere (even in (b)) unless contradicted by later work
(b)	$x^2 = \frac{20}{320}$ or $x = \sqrt{\frac{20}{320}}$			M1 ft if $k \neq 1$ for correct rearrangement NB. The only ft is for the value of k in $F = \frac{k}{x^2}$
		0.25 oe	2	A1 cao (ignore \pm)
				Total 5 marks

Question	Working	Answer	Mark	Notes
9. (a)	$P = kq^3$		3	M1 Allow $kP = q^3$ oe Do not allow $P = q^3$
	$270 = k(7.5)^3$ oe or $k = \frac{270}{7.5^3}$ oe			M1 for correct substitution in a correct equation. Implies first M1
		$P = \frac{16}{25}q^3$		A1 $P = 0.64q^3$ oe with P the subject Award M2A1 if $P = kq^3$ on answer line and k evaluated as $\frac{16}{25}$ in part (a) or part (b)
(b)	Eg $q^2 = \frac{25}{16}$ or $\frac{1}{q^2} = \frac{16}{25}$ or $1 = \frac{16}{25}q^2$ or $q^2 = \frac{1}{0.64}$ Or $P^2 = \frac{25}{16}$ or $\frac{1}{P^2} = \frac{16}{25}$ or $1 = \frac{16}{25}P^2$ or $P^2 = \frac{1}{0.64}$		2	M1 Correct equation involving q^2 or p^2 ft k from an equation of the form $P = kq^3$ if $k \neq 1$
		$1 \frac{1}{4}$		A1 5 4, 1.25 [ignore 0 or negative value.]
				Total 5 marks

Question	Working	Answer	Mark	Notes
10. (a)	$R = \frac{k}{c^2}$ $30 = \frac{k}{4^2} \text{ or } k = 480 \text{ oe}$	$R = \frac{480}{c^2} \text{ oe}$	3	<p>M1 for $R = \frac{k}{c^2}$ but not for $R = \frac{1}{c^2}$</p> <p>Also award for correct equation in R, c^2 and a constant or for $R = \text{numerical value} \div c^2$</p> <p>M1 for $30 = \frac{k}{4^2}$ or for correct substitution into an equation which scores the first method mark (may be implied by correct evaluation of the constant)</p> <p>A1 Award 3 marks if answer is $R = \frac{k}{c^2}$ but k is evaluated in part (b). SCB2 for correct formula for c in terms of R.</p>
(b)	$c^2 = \frac{480}{1920} \text{ or } c^2 = \frac{30}{1920} \times 4^2$	0.5oe	2	<p>M1 M1ft for substitution and rearrangement into form $c^2 = \frac{k}{1920}$ with their value of k substituted except for $k = 1$</p> <p>A1 accept ± 0.5</p>
				Total 5 marks