

Directly and inversely proportionality past paper answers

1.

$y = \frac{40}{\sqrt{x^3}}$	P1	for setting up an equation with a constant term, eg $y = k\sqrt{t}$ or $t = \frac{K}{x^3}$
	P1	for a process to substitute values in one equation, eg $15 = k\sqrt{9}$ or $k = 5$ or $8 = \frac{K}{2^3}$ or $K = 64$
	P1	(dep P2) for combining the two equations fit their values of k and K , eg $y = 5\sqrt{\frac{64}{x^3}}$ OR for $y = 5\sqrt{t}$ and $t = \frac{64}{x^3}$
	A1	oe

2.

(a)	Graph sketched	C1	Sketch
(b)	Graph sketched	C1	Sketch

3.

$x = \frac{1}{2}z^6$	M1	for setting up an equation eg $x = ky^2$ oe or $y = cz^3$ oe
	M1	for eliminating y eg $x = k(cz^3)^2$ oe OR substitutes values in both equations, eg $32 = ky^2$ and $y = c2^3$
	M1	for substituting in 32 and 2 to find the constant, eg $32 = m2^6$ OR combines equations, eg $32 = k c^2 2^6$
	A1	oe

4.

B, A, D, C	B2	for all correct
	(B1	for two or three correct)

5.

$h = \frac{120}{\sqrt{t}}$	P1	for setting up a proportional relationship between h and p , eg $h \propto \frac{1}{p}$ or $h = \frac{k}{p}$ OR a proportional relationship between p and t , eg $p \propto \sqrt{t}$ or $p = K\sqrt{t}$
	P1	for process to substitute at least 2 values, eg $10 = \frac{k}{6}$ ($k = 60$) or $6 = K\sqrt{144}$ ($K = 0.5$)
	P1	for full process leading to $h = \frac{60}{p}$ or $p = "0.5"\sqrt{t}$ or
	A1	$h = \frac{120}{\sqrt{t}}$ or eg $h = \frac{120\sqrt{t}}{t}$ or $h = \frac{60}{0.5\sqrt{t}}$

6.

Evidence of solution	M1	for constructing an equation eg $y \propto \frac{1}{x^3}$ or eg $y = \frac{k}{x^3}$ or
	M1	for substituting in the values a and 44 into $y = \frac{k}{x^3}$
	C1	for a complete method to use the equation, the value of k and $x = 2a$ to show $y = 5.5$ eg $(2a)^3 y = 44a^3$ and $y = 44a^3 \div 8a^3 = 5.5$

7.

Answer	Mark	Mark scheme
$y = \frac{100}{9x^4}$	P1	for setting up a correct proportional relationship, eg $d \propto x^2$ or $d = kx^2$
	P1	for setting up a second proportional relationship, eg $y \propto \frac{1}{d^2}$ or $y = \frac{K}{d^2}$
	P1	(dep P1) for a process to find one of the constants of proportionality eg $24 = k \times 2^2$ ($k = 6$) or $4 = K \div 100$ ($K = 400$)
	P1	full process to find y in terms of x eg $y = \frac{"400"}{("6" x^2)^2}$ oe
	A1	$y = \frac{100}{9x^4}$ oe

8.

BDAC	B2	all correct
	(B1	for at least 2 correct)

9.

$\frac{7}{3}$	M1	for $y = k \sqrt[3]{x}$ oe or $\frac{7}{6} = \sqrt[3]{8} k$ oe
	M1	for $k = \frac{7}{6 \times \sqrt[3]{8}}$ oe
	A1	for $\frac{7}{3}$ oe

10.

$y = \frac{9}{x^2}$	M1	begins to work with $y = \frac{k}{x^2}$ oe e.g. subs of a pair of numbers into $y = \frac{k}{x^2}$ or states $k=9$
	A1	for $y = \frac{9}{x^2}$ Accept $y = 9x^{-2}$
$\frac{3}{4}$	M1	ft (dep on previous M1) subs $y = 16$ into proportional formula of the form $y = \frac{k}{x^2}$ oe
	A1	oe

11.

C, F, A, H	B3 [B2 [B1	for a fully correct table for 2 or 3 correct] for 1 correct]
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12.

9	M1	Finds constant $36 \times 1.5 (=54)$ or $\frac{6}{1.5}=4$
	M1	$54 \div 6$ or $36 \div 4$
	A1	9 cao

13.

explanation	C1	for a correct evaluation, eg the value of D should be multiplied by 8, she has used 2×3 instead of 2^3
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14.

D, A, B, C	B2	B2 for all correct (B1 for at least 2 correct)
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15.

18.3	P1	for a start to the process interpreting the information correctly, eg. $T = k\sqrt{L}$ or
	P1	for a correct scale factor of $\sqrt{1.4}$
	A1	for 18.3 to 18.4