

Topic 19 Proportion equations (Post-TT) [37] MARKSCHEME

1.

(a)		C	1 1 AO2.1a	
(b)		54	2 1 AO1.1 1 AO1.3a	M1 for $36 \times \frac{24}{16}$ oe

2.

(a) (i) $D \propto \frac{1}{P}$ or $D = \frac{k}{P}$ or $DP = k$ M1

$18 = \frac{k}{150}$ M1 dep

$D = \frac{2700}{P}$ A1

(ii) $10 = \frac{2700}{P}, P = \frac{2700}{10}$ M1 dep

Number of people = 270 A1

(b) Sketch of correct curved line not crossing either axis B2
B1 for sketch that shows D decreasing as P increases

[7]

3.

$y \propto \frac{1}{x^2}$ or $y = \frac{k}{x^2}$ M1

oe e.g. $x^2 y = k, x^2 = \frac{k}{y}$. No need for numbers to be substituted.

$k = 12$ A1

$y = 0.75$ A1

Oe

[3]

4.

(a) $W \propto \sqrt{P}$ or $W = k\sqrt{P}$ M1
12 $\propto \sqrt{16}$ or $12 = k\sqrt{16}$ acceptable for M1

$k = 3$ A1

$W = 3\sqrt{P}$ A1

*ft their k, but must be formally stated
 Accept equivalent form eg. $P = (W/3)^2$*

(b) $W = 15$ B1
ft. their k

(c) $\sqrt{P} = 21 \div 3$ or $\sqrt{P} = 7$ B1
allow $21 \div$ (their k)

$P = 49$ B1

ft. for their \sqrt{P} value "squared"

[6]

5.

(a) $F \propto \frac{1}{d^2}$ or $F = \frac{k}{d^2}$ M1
 $Or d^2 \propto \frac{1}{F}$

$$28 = \frac{K}{1.5^2}$$

($k = 63$) M1 dep

$$F = \frac{63}{d^2}$$
 A1

$$Or Fd^2 = 63 \text{ or } d^2 = \frac{63}{F} \text{ o.e.}$$

(b) $43.75 = \frac{63}{d^2}$ M1 dep

Dep on M2 in (a)

1.2 A1

[5]

6.

$M \propto 1/G$ or $M = k/G$ or $MG = k$ M1

$k = 3600$ A1

$M^2 = 3600$ M1

Hence $M = 60$ A1ft

ft their value of k if first M1 earned

[4]

7.

(a) $A \propto d^2$ or $A = kd^2$ M1

When $d = 200$, $A = 20\ 000$

$$20\ 000 = k(200)^2$$

$$k = \frac{20000}{200^2}$$
 M1

$$k = \frac{20000}{40000}$$

$$\text{or } k = 0.5 \text{ or } \frac{1}{2}$$

$$A = 0.5 d^2$$
 A1

May be seen in (b)

$$\text{or accept } A = kd^2 \text{ and } k = \frac{1}{2} \text{ oe}$$

(b) $A = 0.5(1400)^2$ M1

$= 980\ 000$ A1

[5]

8.

Substitute one pair of data into

$$t = k\sqrt{m}, t = k/m \text{ or } t = k/\sqrt{m}$$

M1

Look for valid alternative methods which will still earn this mark

eg The first rule might be eliminated by reasoning that the relationship must be an inverse one since as t increases, m

decreases

Test one of the rules to reach a conclusion

M1

ie Test value of k found from first pair on another pair or find a contradictory value of k

Test a second rule to reach a conclusion

M1

Repeat as above (2-stage process)

Select correct rule (C)

A1

*If testing C only, must use all three pairs otherwise max of M1
M1 M0 A0*

[4]