

Revision F4 (All topics) C [38] MARKSCHEME

1.

(a) $\frac{\theta}{360} \times 2\pi \times 6 = 8.4$ M1

$\theta = \frac{8.4 \times 360}{2\pi \times 6}$ A1

80.2(1...) A1

r = 12 giving 40.1 is M1, A1, A0

r = 3 giving 160.4 is M1, A1, A0

(b) $\frac{h}{6} = \frac{3}{2}$ M1

$h = 9$ (cm) A1

h = 12 gives M1, A0

$\frac{1}{3}\pi \times 6^2 \times (\text{their } 9) - \frac{1}{3}\pi \times 2^2 \times 3$ M1, A1

M1 for difference of two cone volumes

A1 if all correct

(V) = 327 or 326.7(cm³) A1ft

Accept 330 if working seen, ft their h if both M's awarded.

[8]

(b) Alt

linear scale factor 1:3 M1

Must be used. Just writing it down does not qualify as a method unless progress is made.

Volume scale factor 1:27 A1

Volume small cone M1

$\frac{1}{3}\pi \times 2^2 \times 3 = 12.566...$

Volume large cone 27 × DM1

(their 12.566)
339.292...

(V) = 327 or 326.7(cm³) A1

Accept 330 if working seen.

(Scs) 12.566 only B1

339.29 only M1, A1, M1

$\frac{1}{3}\pi \times 36 \times h - \frac{1}{3}\pi \times 4 \times 3$ M1, A1

[8]

2.

(a) $V \propto \frac{1}{p}$ or $v = k \frac{1}{p}$ M1
 OR $p \propto \frac{1}{v}$

When $v = 5$, $p = 150\,000$

$$5 = \frac{k}{150\,000}$$
 M1

$$k = 750\,000$$

$$\therefore v = \frac{750\,000}{p}$$
 A1
 or $pv = 750\,000$

(b) $p = 250\,000 \Rightarrow$

$$v = \frac{750\,000}{250\,000}$$

$$v = 3$$

If M2 gained above

B1 ft

(c) $v = 300$

$$300 = \frac{750\,000}{p}$$
 M1

If M2 gained above

$$p = \frac{750\,000}{300}$$

$$p = 2500$$

A1

[6]

3.

(a) $\frac{1}{3} \times \frac{1}{4}$ or $\frac{2}{3} \times \frac{3}{10}$ M1
One correct product seen

$$\frac{1}{3} \times \frac{4}{5} + \frac{2}{3} \times \frac{3}{10}$$
 or $\frac{4}{15} + \frac{6}{30}$ M1
Both correct products added oe

$$= \frac{7}{15}$$
 A1

Note: $\frac{3}{10} + \frac{4}{5} \neq \frac{7}{15}$!

(b) $\frac{7}{15} \times N = 77$ M1

or $N = 77 \div \frac{7}{15}$ *oe must be $0 \leq p \leq 1$*

$$= 165$$

A1

[5]

4.

(a) $(-1, 0)$

B1

Condone missing brackets

(b) $-\frac{1}{2}$

B1

[2]

5. **Non-calculator**

(a)		B2	<p>Q = Qualifies DNQ = Does not qualify B1 0.2 on DNQ branch or All branches included labelled correctly with Q and DNQ but probabilities not all correct</p>
	<p>Alternative method 1</p>		
(b)	their $0.2 \times$ their 0.8 or 0.16	M1	Look on tree diagram for working
	0.96	A1	
	<p>Alternative method 2</p>		
	$(\text{their } 0.2)^2$ or 0.04	M1	Look on tree diagram for working
	0.96	A1	

6.

(a) $(m - 7)(m + 7)$
oe

B1

(b) Attempt to rearrange one equation and substitute into another
 or

Attempt to balance x or y and eliminate

M1

eg $15x + 9y = 18$

$15x - 35y = 95$

followed by an attempt to subtract

eg $44y = -77$

$35x + 21y = 42$

$9x - 21y = 57$

followed by an attempt to add

eg $44x = 99$

Solving resultant equation to find $x = 2.25$ or $y = -1.75$

A1

Attempt to eliminate other variable or substitution of found value into one of their equations

M1

eg $11.25 + 3y = 6, 5x - 5.25 = 6$

Solving to find another value

$y = -1.75$ or $x = 2.25$

A1

[5]

7.

Sight of correct ratio or scale factor ie $20 : 30, 2 : 3, \frac{2}{3}, 1 \frac{1}{2}$

M1

oe sight of $\frac{3}{5}$ or $\frac{2}{5}$ earns this mark

$$\frac{3}{5} \times 40$$

M1

oe eg might work out $\frac{2}{5}$ then subtract

24

A1

Note 2 : 3 ratio might be scaled up to give ratio of 16 : 24 (M1, M1)

Must state $h = 24$ for A1

Alternatively

$$\begin{aligned} h/30 &= (40 - h)/20 \text{ M1} \\ 20h &= 30(40 - h) \\ 20h &= 1200 - 30h \text{ M1} \\ 50h &= 1200 \\ h &= 24 \quad \text{A1} \end{aligned}$$

[3]

8.

(a) (i) $-\mathbf{b} + \mathbf{a}$ or $\mathbf{a} - \mathbf{b}$

B1

(ii) $\mathbf{b} - \frac{1}{2} \mathbf{a}$
oe

B1

(b) $\overrightarrow{BN} = \overrightarrow{BM} + \overrightarrow{MN} = \overrightarrow{BM} + \overrightarrow{AM}$
oe

M1

$$= \frac{1}{2} \mathbf{a} + \mathbf{b} - \frac{1}{2} \mathbf{a}$$

A1

(c) $\overrightarrow{ON} = 2\overrightarrow{OB}$

B1

or OBN a straight line
or $BN = OB$
or B is midpoint of ON

[5]