

## Revision F4 (All topics) B [56] MARKSCHEME

1.

(a)  $V \propto h^3$  or  $V = kh^3$  M1

$500 = k \times 10^3$  M1

$V = \frac{1}{2}h^3$  or  $2V = h^3$  A1

*Accept  $k = 0.5$*

(b) 13 500 B1

(c)  $5000 = \frac{1}{2}h^3$  M1

$h^3 = 10\,000$

$h = \sqrt[3]{10000}$  M1

$= 21.5\dots$  A1

[7]

2.

(a)  $7x - 14y - 6x + 3y$  M1  
 $x - 11y$  A1

(b) (i) w8 A1

(ii) w6 A1

(iii) w12 A1

(c) (i)  $(y - 2)(y - 3)$  A1 A1

(ii)  $y = 2$  and  $y = 3$  A1

[8]

3.

DC = BC (sides of equilat.  $\Delta$ ) B1

AC = EC (sides of equilat.  $\Delta$ ) B1

$\angle ACD = \angle ECB = 60^\circ + \angle C$  B1

SAS B1

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4.

Throughout this question equivalent fractions or decimals to 2dp are acceptable.

- (a)  $p + \text{sum of given probs} = 1$  M1  
*Or equivalent e.g.  $1 - \frac{8}{9} = p$*
- $p = \frac{1}{9}$  A1  
*oe. e.g.  $\frac{2}{18}$ , 0.11...*
- (b) (i)  $\frac{5}{6}, \frac{1}{6}, \frac{5}{6}, \frac{1}{6}, \frac{5}{6}$  B2  
*-1eeoo*
- (ii) Sum of 4, not 4 and not 4, 4 M1  
*Must be  $p_1 \times p_2 + p_3 \times p_4$*
- Correct probs  $\frac{1}{6} \times \frac{5}{6} + \frac{5}{6} \times \frac{1}{6} = (\frac{5}{36} + \frac{5}{36})$  A1  
 $= \frac{10}{36} = \frac{5}{18}$  A1 ft  
*ft their probs if M1 awarded*

[7]

5.

- (a) (i)  $\text{fds} = \text{frequency} \div \text{class width}$  M1  
*M1 for attempt to find f.d's or use of 'scaling method'*
- $= 5, 70, 170, 50, 20$  A1  
*A1 if all correct or heights in proportion. e.g. 1, 14, 34, 10, 4 or 25, 350, 850, 250, 100*
- Plotting between limits to correct heights A1 ft.  
*ft their fds*  
*No scale on graph deduct a mark*
- (ii) 100 B1
- (b) 60 members = area below 50 M1  
*This mark is for identifying that the area below 50 is equivalent to 60 members*
- area above 90 B1  
*e.g. 33 rows, 165 squares, 6.6 'squares'*
- scale factor = 1.5 or  $\frac{3}{2}$  M1  
ratio = 90:165 = 1:1.833  
Fraction = 165/90 = 11/6  
*oe e.g.  $\frac{2}{3}$  members per square, or 1.5 squares per person*
- $165 \div 1.5 \dots = 110$  A1 ft  
 $60 \times 33 = 110$   
 $60 \div 6 \times 11 = 110$   
*ft their scale factor if both M1s awarded but do not award if answer is not integer*

[8]

6.

$\frac{4}{3 \times 2} \pi x^3 + \frac{4}{3} \pi x^3 = 2 \pi x^3$ $(2x)^2 \pi h = 4x^2 \pi h$ $4x^2 \pi h = 2 \pi x^3$	$h = \frac{x}{2}$	P1 Process to find volume of cone or hemisphere P1 Process to total volume of solid P1 Process to find volume of cylinder P1 Equates 2 volumes A1 Reaches $h = \frac{x}{2}$
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7.

- (a) (i)  $10^2 - 5^2 (= QR^2)$  M1  
 $(QR =) \sqrt{75}$  M1dep  
 $8.66(0\dots), 5\sqrt{3}$  A1  
*Accept 8.7 for 3/3*  
*8.6 only implies M2*
- (a) (ii) Sight of cosine M1  
 $(\text{Angle } QPR =) \cos^{-1}(5 \div 10)$  oe M1dep  
*Alternative ratios using (a)(i) must be*  
 $\sin^{-1}('a)(i)' \div 10)$  M2  
 $\tan^{-1}('a)(i)' \div 5)$  M2  
*sine rule:  $\sin x = (\text{anything} \times \sin 90 \div 10)$  M2*  
 $60^\circ$  A1  
*No ft*  
*60 seen with no working full marks.*
- (b) Area  $ADX =$  their (a)(i)  $\times 2.5$  oe M1  
 $= 21.65(0\dots)$  *if exact value or 8.66 used*  
 $= 21.75$  *if 8.7 used*
- Area  $AXB = (\text{any angle}) \div 360 \times \pi \times 10^2$  M1  
*Accept  $100\pi \div 3, 4, 5, 6, 8, 9, 10, 15, 20$*   
 $= 26.2, 26.18, 26.1799(3\dots)$  A1ft  
*ft their angle*
- Shaded area  $50 - ('their 21.65' + 'their 26.18')$  M1dep  
*Dependent on both Ms*  
 $2.16$  to  $2.183$  (if 8.66 used)  
 $2.06$  to  $2.083$  (if 8.7 used) A1  
*Allow 2.2 with working using 8.66*  
*Allow 2.1 with working using 8.7*  
*NB accuracy is as stated, which allows for a range of values of  $\pi$  from 3.14 to 3.142 and final answer to 2sf or 3sf accuracy.*

8.

**Note: Probability - Accept fraction, decimal or percentage. Do not accept ratio.**

eg 1 out of 3 or 1 in 3 penalise once on whole paper.

(a) First set of branches correctly labelled with 6/not 6 and correct probabilities B1

*Or Bag A and Bag B labels as long as unambiguous or 2<sup>nd</sup> labels in outcome columns*

Second set - Bag A has probs

red  $\frac{3}{7}$ , green  $\frac{4}{7}$

B1 dep

*Condone omission of labelling of bags if there is no ambiguity  
Must have R, G labels*

Second set - Bag B has probs

red  $\frac{2}{5}$ , green  $\frac{3}{5}$

B1 dep

*Dependent upon correct true diagram structure*

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(b)  $\frac{1}{6} \times \frac{3}{7}$  and  $\frac{5}{6} \times \frac{2}{5}$  M1

*oe ft if clearly unambiguous from correct structured tree diagram*

“ $\frac{1}{14}$ ” + “ $\frac{1}{3}$ ”

M1

*oe ft if clearly unambiguous from correct structured tree diagram*

$\frac{17}{42}$

A1

*Accept  $\frac{51}{126}$*

[6]