

Revision F4 (Topics 11-18) [56] MARKSCHEME

1.

(a)	(i)	Triangle at (-6, -3), (-6, -5), (-2, -5)	2 2 A02.3b	B1 for correct reflection in $x = 0$ or reflection in $y = k$	
	(ii)	Triangle at (5, 2), (5, 6), (3, 6)	2 2 A02.3b	B1 for correct orientation and size but incorrect position or correct anticlockwise rotation about (0, 0) by 90°	
(b)	(i)	Translation $\begin{pmatrix} 8 \\ -6 \end{pmatrix}$	2 1 A02.1a 1 A02.3b	B1 for either	More than one transformation given spoils all marks
	(ii)	Enlargement [SF] $\frac{1}{2}$ oe [Centre] (2, 3)	3 1 A02.1a 2 A02.3b	B1 for each	More than one transformation given spoils all marks
(c)		Incorrect with correct example	1 1 A02.5a		e.g. enlargement gives a similar shape Accept stretch, shear also

2.

- (a) $1.66 \leq x < 6$ M1
oe May be implied from A1 below
- 2, 3, 4, 5 A2
-1 eeo
- (b) $20 = 4y$ M1
 5 A1
- (c) $(z \pm 1)(z \pm 8)$ M1
 (+)1 A1
Must fit from their brackets
- (+)8 A1

[8]

3.

(a)	$4a - 3b$	2 1 A01.3b 1 A02.3b	B1 for $\overline{AD} = 3a$ or $\overline{BC} = 2b$ soi	Allow $\overline{OD} = 4a$ or $\overline{OC} = 3b$ for B1
(b)	$\overline{AD} = \overline{CE} = 3a$ $\overline{AC} = \overline{DE} = 3b - a$ Opposite sides equal and parallel hence ACED is a parallelogram	M2 M2 A1 1 A02.4a 3 A03.1b 1 A03.3	M1 for $\overline{AD} = 3a$ or $\overline{CE} = 3a$ M1 for $\overline{AC} = 3b - a$ or $\overline{DE} = 3b - a$	

4.

(a) $(m - 7)(m + 7)$ B1
oe

(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]

5.

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) $\frac{7}{11} \times \frac{6}{10}$ M1

$= \frac{42}{110}$ A1

oe ($= \frac{21}{55}$) (0.38 or better)

(b) $\frac{4}{11} \times \frac{7}{10}$ or $\frac{7}{11} \times \frac{4}{10}$ M1 dep

One correct product

$(\frac{4}{11} \times \frac{7}{10}) + (\frac{7}{11} \times \frac{4}{10})$ M1

or $\frac{4}{11} \times \frac{7}{10} \times 2$ *oe*

$= \frac{56}{110} = \frac{28}{55}$ A1

oe (0.51 or better)

0.50 from 0.25×2 must see working

Answers with replacement fully correct

(a) $\frac{49}{121}$ and (b) $\frac{56}{121}$ scores SC2

[5]

6.

(a) $\frac{4}{3} \pi r^3 = 2 \times \frac{1}{3} \pi r^2 x$ M1

Must include the factor of 2

Allow use of h instead of x

Simplified to give $x = 2r$ A1

Alternatively

Allow substitution of 2r for height of cone and verification of result

ie $2 \times \text{Vol cone} = 2 \times \frac{1}{3} \times \pi \times r^2 \times 2r$ M1

$= \frac{4}{3} \pi r^3$ (must be seen) A1

(b) $(l)^2 = r^2 + 4r^2$ M1

$(l)^2 = r^2 + (2r)^2$ is M1 $(l)^2 = r^2 + 2r^2$ is M0

$(l) = \sqrt{5} r$ A1

Surface area cone = $\pi \times r \times \sqrt{5} r$ M1

Using their l if from an attempt at Pythagoras

$4 : \sqrt{5}$ A1

Allow $\sqrt{5} : 4$

SC2 for a complete numerical solution

[6]

7. Second differences = 6 so coefficient of n^2 is 3 [B1]

Attempt to find the rest of the formula: [M1]

E.g. $3 + b + c = 2$ gives $b + c = -1$

$12 + 2b + c = 10$ gives $2b + c = -2$

Either $b = -1$ or $c = 0$ [A1]

Formula is $3n^2 - n$ [A1]

8.

Finds total of at least first 4 bars M1

60, 40, 100, 40, (30, 50)

Finds cumulative total at least as far as 200. M1

60, 100, 200, (240, 270, 320).

NB these can occur in either part and cumulative totals implies bar totals.

Median = 102 A1

Correct answer for either part scores 2

IQR = 35 A1

Sc No previous Ms awarded 85 – 120 or 120 – 85 seen allow M1.

[4]

9.

(a)	10 metres	3 1 AO1.3a 2 AO3.1c	M1 for correct ratio $\frac{\text{height}}{20} = \frac{30}{60}$ oe M1 rearrange Or M1 for scale factor 0.5 M1 for 20×0.5	
(b)	2 valid reasons, e.g. She would have to be very far from the building. The estimate is likely to be inaccurate due to the scale factors at the distances involved.	2 2 AO3.4a		

10.

- (a) $\frac{3}{4} \times (2 \times \pi \times 12)$ M1
- 18π A1
- Not $\pi 18$, unless notation previously penalised*
 $\pi \times 18$ is acceptable
- (b) $2 \times \pi \times r = \text{their } 18\pi$ M1
- Or their $18\pi \div 2\pi$*
- $r = 9$ A1ft
- $r = \frac{3}{4}$ of $12 = 9$ scores 2 marks*

[4]