

FOR OFFICIAL USE



Teisteanais
Nàiseanta
EISIMPLEIR A-MHÀIN

Comharra

S874/75/01

Matamataig
Pàipear 1 (Gun Àireamhair)

Deit — Gun bhuinteanas

Ùine — 1 uair



* S 8 7 4 7 5 0 1 *

Lìon na bogsaichean seo agus leugh na tha air a chlà-bhualadh gu h-ìosal.

Làn ainm na sgoile no colaiste

Baile

Ciad ainm(ean)

Sloinneadh

Àireamh an
t-suidheachain

Latha-breith

Latha

Mìos

Bliadhna

Àireamh an oileanaich

Comharran gu lèir — 40

Feuch na ceistean UILE.

CHAN FHAOD thu àireamhair a chleachdadh.

Gus na comharran gu lèir fhaighinn, feumaidh tu d' obrachadh a-mach a shealltainn sna freagairtean agad.

Cuir na h-aonadan anns na freagairtean agad far a bheil sin iomchaidh.

Sgrìobh do fhreagairtean gu soilleir anns na beàrnan san leabhran seo. Tha àite a bharrachd airson fhreagairtean aig deireadh an leabhra seo. Ma chleachdas tu an t-àite seo, feumaidh tu àireamh na ceiste a tha thu a' freagairt a chomharrachadh gu soilleir.

Cleachd inc **gorm** no **dubh**.

Mus fàg thu seòmar na deuchainne feumaidh tu an leabhran seo a thoirt don Fhreiceadan; mura dèan thu sin, dh'fhaodadh tu na comharran gu lèir airson a' phàipeir seo a chall.



* S 8 7 4 7 5 0 1 0 1 *

LIOSTA FHOIRMLEAN

Na freumhan aig $ax^2 + bx + c = 0$ is iad $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

An riaghailt sine $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

An riaghailt cosine $a^2 = b^2 + c^2 - 2bc \cos A$ no $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Farsaingeachd triantain $A = \frac{1}{2}ab \sin C$

Tomhas-lìonaidh cruinne $V = \frac{4}{3}\pi r^3$

Tomhas-lìonaidh còin $V = \frac{1}{3}\pi r^2 h$

Tomhas-lìonaidh pioramaid $V = \frac{1}{3}Ah$

Claonadh àbhaisteach $s = \sqrt{\frac{\sum(x - \bar{x})^2}{n-1}}$

no $s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}}$, far as e n meud an taghaidh.



* S 8 7 4 7 5 0 1 0 2 *

Comharran gu lèir — 40

Feuch na ceistean UILE

1. Oobraich a-mach luach $2\frac{1}{3} + \frac{4}{5}$.

2

2. Lorg an vector toradh $2\mathbf{u} - \mathbf{v}$ nuair a tha $\mathbf{u} = \begin{pmatrix} -2 \\ 3 \\ 5 \end{pmatrix}$ agus $\mathbf{v} = \begin{pmatrix} 0 \\ -4 \\ 7 \end{pmatrix}$.

Sgrìobh do fhreagairt ann an cruth co-phàirteach.

2

[Tionndaidh an duilleag



* S 8 7 4 7 5 0 1 0 3 *

3. Fuasgail, gu h-ailseabrach, an siostam cho-aontaran

$$4x + 5y = -3$$

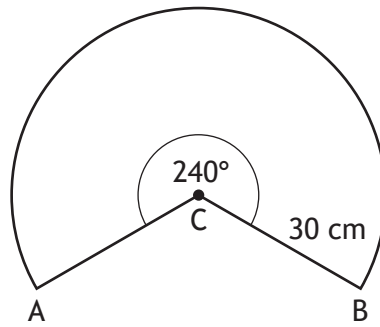
$$6x - 2y = 5.$$

3



* S 8 7 4 7 5 0 1 0 4 *

4. Tha an diagram gu h-ìosal a' sealltainn earrann de chearcail, meadhan C.



Tha radius a' chearcaill 30 ceudameatairean.

Obraich a-mach faid a' phrìomh arc AB.

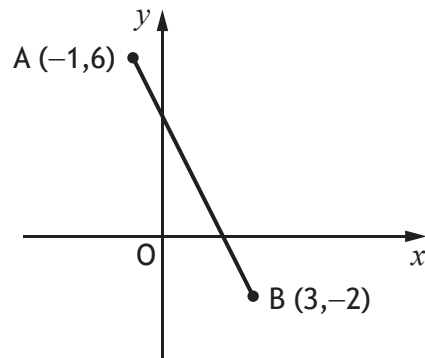
Gabh $\pi = 3.14$.

3

[Tionndaidh an duilleag



5. Tha an diagram gu h-ìosal a' sealltainn na loidhne dhìreach a' ceangal puingean A agus B.



Lorg co-aontar na loidhne AB.

Sgrìobh an co-aontar anns an riochd as sìmplidhe.

3



6. Atharraich cuspair an fhoirmle $D = \frac{B+4}{C^2}$ gu B .

2

7. Obraich a-mach nàdar freumhan an fhuincsein $f(x) = x^2 + 4x - 7$.

2

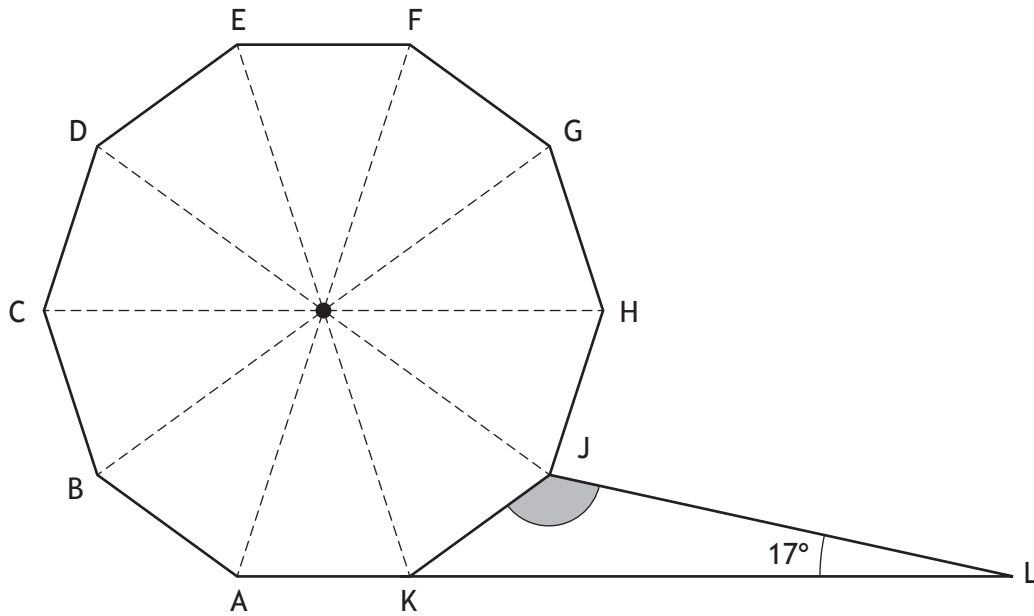
[Tionndaidh an duilleag



* S 8 7 4 7 5 0 1 0 7 *

8. Anns an dealbh gu h-ìosal, tha ABCDEFGHJK na dhecagon cunbhalach.

- Tha ceàrn KLJ 17° .
- Is e loidhne dhìreach a th' ann am AKL.



Obraich a-mach meud a' cheàirn dhathte KJL.

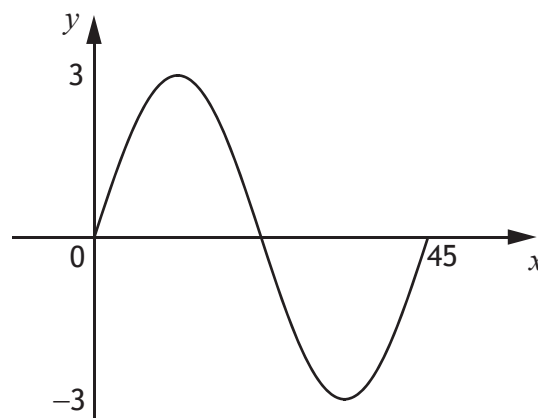
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9. Sgrìobh $\sqrt{50} + \sqrt{45} - \sqrt{2}$ anns an riochd as sìmplidhe.

3

10. Tha pàirt den ghraf $y = a \sin bx^\circ$ air a shealltainn san diagram.



(a) Inns luach a .

1

(b) Inns luach b .

1

[Tionndaidh an duilleag



11. Simplich $(m^{-2})^4 \times m^{-5}$.

Sgrìobh do fhreagairt le cumhachd dhearbhte.

3



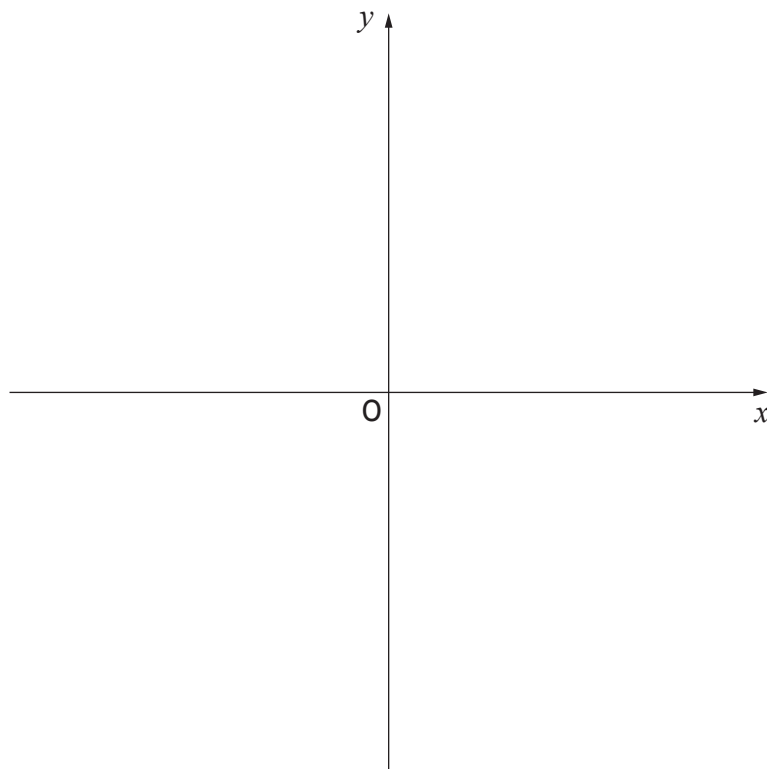
* S 8 7 4 7 5 0 1 1 0 *

12. Dèan sgeidse de ghraf $y = (x - 6)(x + 4)$.

Anns an sgeidse agad, seall gu soilleir na puingean-trasnaidh leis an x -axis agus an y -axis, agus co-chomharran na puing-tionndaidh.

3

(Gheibh thu axes a bharrachd, ma tha feum orra, air *duilleag 15*.)



[Tionndaidh an duilleag



13. Fuasgail an co-aontar

$$\frac{2x}{3} - \frac{5}{6} = 2x.$$

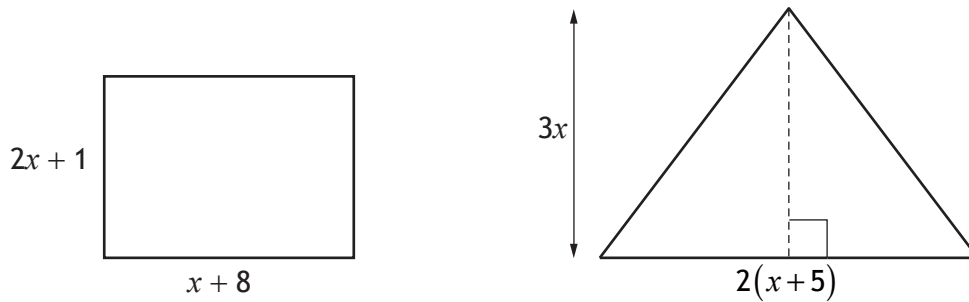
Sgrìobh do fhreagairt anns an riochd as sìmplidhe.

3



* S 8 7 4 7 5 0 1 1 2 *

14. Tha na diagraman gu h-ìosal a' sealltainn ceart-cheàrnach agus triantan. Tha gach tomhas ann an ceudameatairean.



- (a) Lorg abairt airson farsaingeachd a' cheart-cheàrnach.

1

- (b) Ma tha farsaingeachd a' cheart-cheàrnaich ionann ri farsaingeachd an triantain, seall gu bheil $x^2 - 2x - 8 = 0$.

3

[Tionndaidh an duilleag



* S 8 7 4 7 5 0 1 1 3 *

14. (a' leantainn)

(c) Mar sin lorg, a thaobh ailseabra, fad agus leud na ceart-cheàrnach.

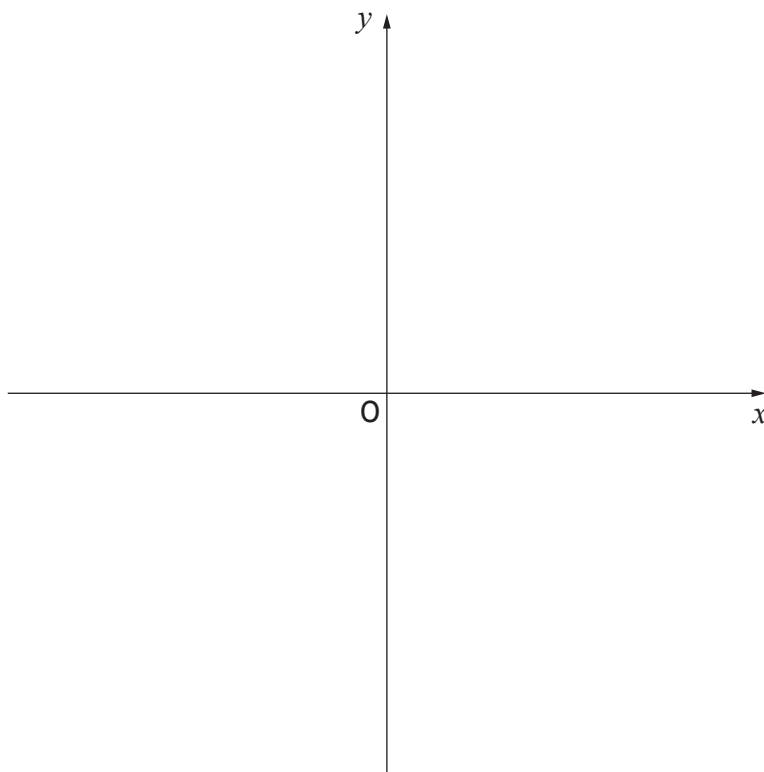
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[CRÌOCH A' PHÀIPEIR EISIMPLEIR]



ÀITE A BHARRACHD AIRSON FHREAGAIRTEAN

Axes a bharrachd airson ceist 12



ÀITE A BHARRACHD AIRSON FHREAGAIRTEAN



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National
Qualifications
SPECIMEN ONLY

S847/75/01

**Mathematics
Paper 1 (Non-calculator)**

Marking Instructions

These marking instructions have been provided to show how SQA would mark this specimen question paper.

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General marking principles for National 5 Mathematics

Always apply these general principles. Use them in conjunction with the detailed marking instructions, which identify the key features required in candidates' responses.

For each question, the marking instructions are generally in two sections:

generic scheme – this indicates why each mark is awarded

illustrative scheme – this covers methods which are commonly seen throughout the marking

In general, you should use the illustrative scheme. Only use the generic scheme where a candidate has used a method not covered in the illustrative scheme.

- (a) Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.
- (b) If you are uncertain how to assess a specific candidate response because it is not covered by the general marking principles or the detailed marking instructions, you must seek guidance from your team leader.
- (c) One mark is available for each •. There are no half marks.
- (d) If a candidate's response contains an error, all working subsequent to this error must still be marked. Only award marks if the level of difficulty in their working is similar to the level of difficulty in the illustrative scheme.
- (e) Only award full marks where the solution contains appropriate working. A correct answer with no working receives no mark, unless specifically mentioned in the marking instructions.
- (f) Candidates may use any mathematically correct method to answer questions, except in cases where a particular method is specified or excluded.
- (g) If an error is trivial, casual or insignificant, for example $6 \times 6 = 12$, candidates lose the opportunity to gain a mark, except for instances such as the second example in point (h) below.

- (h) If a candidate makes a transcription error (question paper to script or within script), they lose the opportunity to gain the next process mark, for example

This is a transcription error and so the mark is not awarded.

$$x^2 + 5x + 7 = 9x + 4$$

This is no longer a solution of a quadratic equation, so the mark is not awarded.

$$x - 4x + 3 = 0$$

$$x = 1$$

The following example is an exception to the above

This error is not treated as a transcription error, as the candidate deals with the intended quadratic equation. The candidate has been given the benefit of the doubt and all marks awarded.

$$x^2 + 5x + 7 = 9x + 4$$

$$x - 4x + 3 = 0$$

$$(x - 3)(x - 1) = 0$$

$$x = 1 \text{ or } 3$$

(i) **Horizontal/vertical marking**

If a question results in two pairs of solutions, apply the following technique, but only if indicated in the detailed marking instructions for the question.

Example:

$$\begin{array}{cc} \bullet^5 & \bullet^6 \\ \bullet^5 & x = 2 \quad x = -4 \\ \bullet^6 & y = 5 \quad y = -7 \end{array}$$

Horizontal: $\bullet^5 x = 2 \text{ and } x = -4$ Vertical: $\bullet^5 x = 2 \text{ and } y = 5$
 $\bullet^6 y = 5 \text{ and } y = -7$ $\bullet^6 x = -4 \text{ and } y = -7$

You must choose whichever method benefits the candidate, **not** a combination of both.

- (j) In final answers, candidates should simplify numerical values as far as possible unless specifically mentioned in the detailed marking instruction. For example

$$\frac{15}{12} \text{ must be simplified to } \frac{5}{4} \text{ or } 1\frac{1}{4} \qquad \frac{43}{1} \text{ must be simplified to } 43$$

$$\frac{15}{0.3} \text{ must be simplified to } 50 \qquad \frac{4}{\cancel{5}}/3 \text{ must be simplified to } \frac{4}{15}$$

$$\sqrt{64} \text{ must be simplified to } 8^*$$

*The square root of perfect squares up to and including 144 must be known.

(k) Do not penalise candidates for any of the following, unless specifically mentioned in the detailed marking instructions:

- working subsequent to a correct answer
- correct working in the wrong part of a question
- legitimate variations in numerical answers/algebraic expressions, for example angles in degrees rounded to nearest degree
- omission of units
- bad form (bad form only becomes bad form if subsequent working is correct), for example

$(x^3 + 2x^2 + 3x + 2)(2x + 1)$ written as

$$(x^3 + 2x^2 + 3x + 2) \times 2x + 1$$

$$= 2x^4 + 5x^3 + 8x^2 + 7x + 2$$

gains full credit

- repeated error within a question, but not between questions or papers

(l) In any ‘Show that...’ question, where candidates have to arrive at a required result, the last mark is not awarded as a follow-through from a previous error, unless specified in the detailed marking instructions.

(m) You must check all working carefully, even where a fundamental misunderstanding is apparent early in a candidate’s response. You may still be able to award marks later in the question so you must refer continually to the marking instructions. The appearance of the correct answer does not necessarily indicate that you can award all the available marks to a candidate.

(n) You should mark legible scored-out working that has not been replaced. However, if the scored-out working has been replaced, you must only mark the replacement working.

(o) If candidates make multiple attempts using the same strategy and do not identify their final answer, mark all attempts and award the lowest mark. If candidates try different valid strategies, apply the above rule to attempts within each strategy and then award the highest mark.

For example:

Strategy 1 attempt 1 is worth 3 marks.	Strategy 2 attempt 1 is worth 1 mark.
Strategy 1 attempt 2 is worth 4 marks.	Strategy 2 attempt 2 is worth 5 marks.
From the attempts using strategy 1, the resultant mark would be 3.	From the attempts using strategy 2, the resultant mark would be 1.

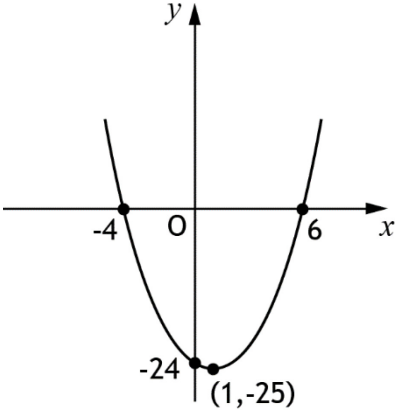
In this case, award 3 marks.

Marking Instructions for each question

Question		Generic scheme	Illustrative scheme	Max mark
1.		<ul style="list-style-type: none"> •¹ identify common denominator •² answer 	<ul style="list-style-type: none"> •¹ $2\frac{\dots}{15} + \frac{\dots}{15}$ or $\frac{\dots}{15} + \frac{\dots}{15}$ •² $3\frac{2}{15}$ or $\frac{47}{15}$ 	2
2.		<ul style="list-style-type: none"> •¹ calculate $2u$ •² answer 	<ul style="list-style-type: none"> •¹ $\begin{pmatrix} -4 \\ 6 \\ 10 \end{pmatrix}$ •² $\begin{pmatrix} -4 \\ 10 \\ 3 \end{pmatrix}$ 	2
3.		<ul style="list-style-type: none"> •¹ correct scaling •² value for one variable •³ value for other variable 	<ul style="list-style-type: none"> •¹ eg $8x + 10y = -6$ $30x - 10y = 25$ OR $12x + 15y = -9$ $12x - 4y = 10$ •² $x = 0.5$ or $y = -1$ •³ $y = -1$ or $x = 0.5$ 	3
4.		<ul style="list-style-type: none"> •¹ appropriate fraction •² consistent substitution into length of arc formula •³ calculate length of arc 	<ul style="list-style-type: none"> •¹ $\frac{240}{360}$ or equivalent •² $\frac{240}{360} \times 3 \cdot 14 \times 60$ •³ 125.6 (cm) 	3

Question		Generic scheme	Illustrative scheme	Max mark
5.		<ul style="list-style-type: none"> •¹ find gradient •² substitute gradient and a point into $y - b = m(x - a)$ or $y = mx + c$ •³ state equation in simplest form (remove any brackets and collect constants) 	<ul style="list-style-type: none"> •¹ $-\frac{8}{4}$ or equivalent •² $y - (-2) = -\frac{8}{4}(x - 3)$ or $y - 6 = -\frac{8}{4}(x - (-1))$ or $-2 = -\frac{8}{4} \times 3 + c$ or $6 = -\frac{8}{4} \times (-1) + c$ •³ $y = -2x + 4$ or equivalent 	3
6.		<ul style="list-style-type: none"> •¹ multiply by C^2 •² subtract 4 	<ul style="list-style-type: none"> •¹ $C^2D = B + 4$ •² $B = C^2D - 4$ or equivalent 	2
7.		<ul style="list-style-type: none"> •¹ calculate discriminant •² state nature of roots 	<ul style="list-style-type: none"> •¹ 44 •² two real and distinct roots 	2
8.		<ul style="list-style-type: none"> •¹ calculate the size of angle AKJ or angle JKL •² calculate the size of angle KJL 	<ul style="list-style-type: none"> •¹ $AKJ = 72 + 72$ or $JKL = 36$ •² 127 	2

Question		Generic scheme	Illustrative scheme	Max mark
9.		<ul style="list-style-type: none"> •¹ simplify $\sqrt{50}$ •² simplify $\sqrt{45}$ •³ express in simplest form 	<ul style="list-style-type: none"> •¹ $5\sqrt{2}$ •² $3\sqrt{5}$ •³ $4\sqrt{2} + 3\sqrt{5}$ 	3
10.	(a)	<ul style="list-style-type: none"> •¹ state the value of a 	<ul style="list-style-type: none"> •¹ 3 	1
	(b)	<ul style="list-style-type: none"> •² state the value of b 	<ul style="list-style-type: none"> •² 8 	1
11.		<p>Method 1</p> <ul style="list-style-type: none"> •¹ apply $(m^a)^b = m^{ab}$ •² apply $m^a \times m^b = m^{a+b}$ •³ apply $m^{-a} = \frac{1}{m^a}$ <p>Method 2</p> <ul style="list-style-type: none"> •¹ apply $(m^a)^b = m^{ab}$ •² apply $m^{-a} = \frac{1}{m^a}$ •³ complete simplification <p>Method 3</p> <ul style="list-style-type: none"> •¹ apply $m^{-a} = \frac{1}{m^a}$ •² apply $\left(\frac{1}{m^a}\right)^b = \frac{1}{m^{ab}}$ •³ complete simplification 	<ul style="list-style-type: none"> •¹ m^{-8} •² m^{-13} •³ $\frac{1}{m^{13}}$ <ul style="list-style-type: none"> •¹ m^{-8} •² $\frac{1}{m^8}$ or $\frac{1}{m^5}$ •³ $\frac{1}{m^{13}}$ <ul style="list-style-type: none"> •¹ $\left(\frac{1}{m^2}\right)^4$ or $\frac{1}{m^5}$ •² $\frac{1}{m^8}$ •³ $\frac{1}{m^{13}}$ 	3

Question		Generic scheme	Illustrative scheme	Max mark
12.		<ul style="list-style-type: none"> •¹ identify roots •² identify turning point OR y-intercept •³ identify the turning point AND the y-intercept and sketch a consistently annotated parabola 	<ul style="list-style-type: none"> •¹ -4 AND 6 •² (1, -25) OR -24 •³ (1, -25) AND -24 and consistently annotated parabola 	3
13.		<p>Method 1</p> <ul style="list-style-type: none"> •¹ multiply throughout by 6 •² rearrange •³ solve for x <p>Method 2</p> <ul style="list-style-type: none"> •¹ rearrange •² start to solve for x •³ solve for x 	<ul style="list-style-type: none"> •¹ $4x - 5 = 12x$ •² $-8x = 5$ or $-5 = 8x$ •³ $x = -\frac{5}{8}$ or $x = -0.625$ <ul style="list-style-type: none"> •¹ $\frac{4}{3}x = -\frac{5}{6}$ •² $x = -\frac{5}{6} \times \frac{3}{4}$ or $24x = -15$ or equivalent •³ $x = -\frac{5}{8}$ or $x = -0.625$ 	3

Question		Generic scheme	Illustrative scheme	Max mark
14.	(a)	<ul style="list-style-type: none"> •¹ find an expression for the area of the rectangle 	<ul style="list-style-type: none"> •¹ $(2x+1)(x+8)$ or equivalent 	1
	(b)	<ul style="list-style-type: none"> •² find expanded expression for the area of the rectangle •³ find expanded expression for the area of the triangle •⁴ equate expanded expressions and rearrange into required form 	<ul style="list-style-type: none"> •² $2x^2 + 16x + x + 8$ •³ $3x^2 + 15x$ •⁴ $2x^2 + 16x + x + 8 = 3x^2 + 15x$ $\Rightarrow x^2 - 2x - 8 = 0$ 	3
	(c)	<ul style="list-style-type: none"> •⁵ factorise $x^2 - 2x - 8$ •⁶ solve equation •⁷ reject invalid value of x and state length and breadth of rectangle 	<ul style="list-style-type: none"> •⁵ $(x-4)(x+2)$ •⁶ $x = 4$ and $x = -2$ •⁷ 12 (cm) and 9 (cm) 	3

[END OF SPECIMEN MARKING INSTRUCTIONS]