Cambridge Assessment
International Education

Practice Questions
Cambridge IGCSE™
Mathematics 0580

To accompany the revised syllabus for examination from 2020.

Cambridge Pathway

Contents

Introduction

The purpose of this booklet is to provide additional practice questions and answers for some topics which have been introduced into Cambridge IGCSE Mathematics (0580) for first assessment in 2020.

Practice questions have been provided to exemplify a range of types of questions which could appear either as whole questions or as parts of larger structured questions.

The answers and a typical mark scheme are also provided.

Other support materials are available on the School Support Hub
https://schoolsupporthub.cambridgeinternational.org

E2.5 Simultaneous equations

1 Solve the simultaneous equations.
You must show all your working.

$$y = 3x - 2$$
$$y = x^2$$

$x =$ .... $y =$ ....

$x =$ .... $y =$ .... [4]

2 The graphs of $y = 3x^2 + 7x - 4$ and $y + 2x = 10$ intersect at the points A and B.

Find the coordinates of A and B.
You must show all your working and give your answers correct to two decimal places.

A (..................., ...)

B (..................., ...) [7]

E2.11 Recognise, sketch and interpret graphs of functions

3

A

B

C

D

E

F
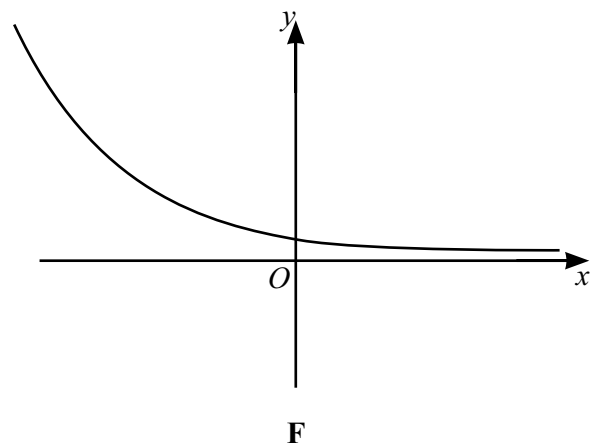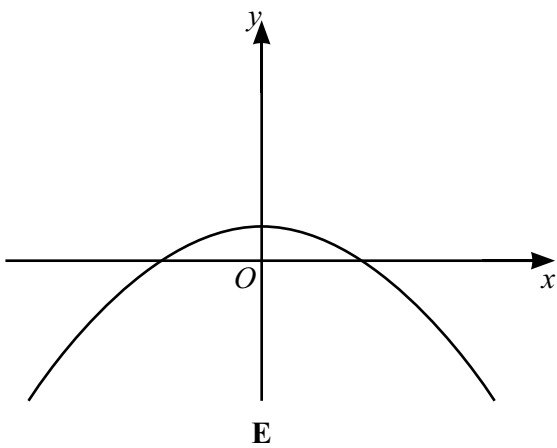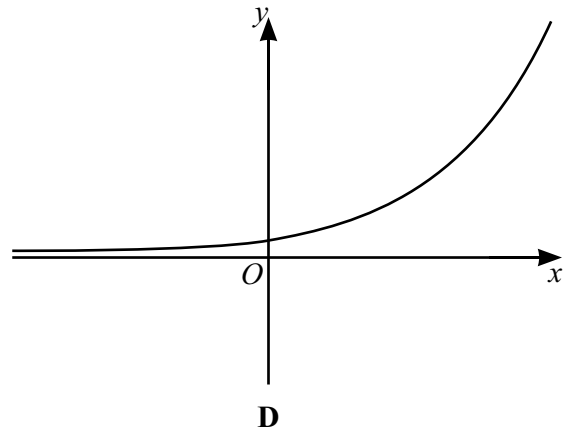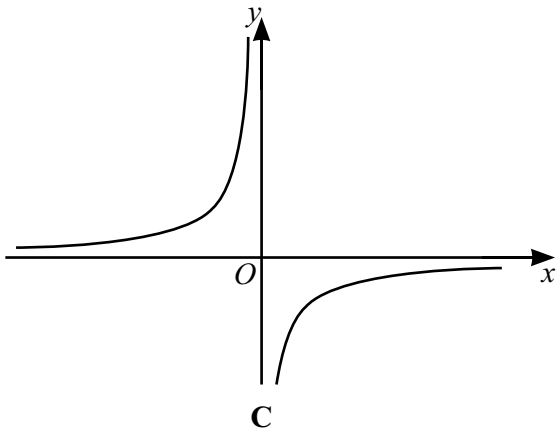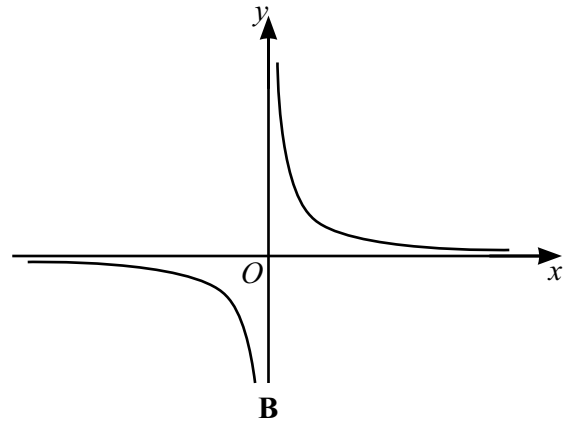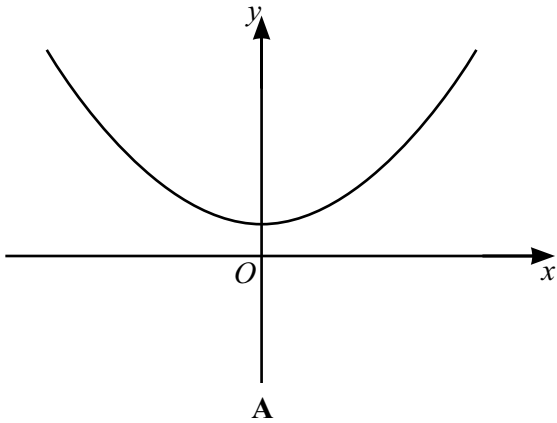
Write down the letter of the graph which could represent each of the following equations.

(a) $y = 2 - x^2$ .... [1]

(b) $y = 2^{-x}$ .... [1]

(c) $y = \dfrac{2}{x}$ .... [1]

4   Sketch the graph of $2x + 3y = 18$.
On your sketch, write the values where the graph crosses the *x*-axis and the *y*-axis.
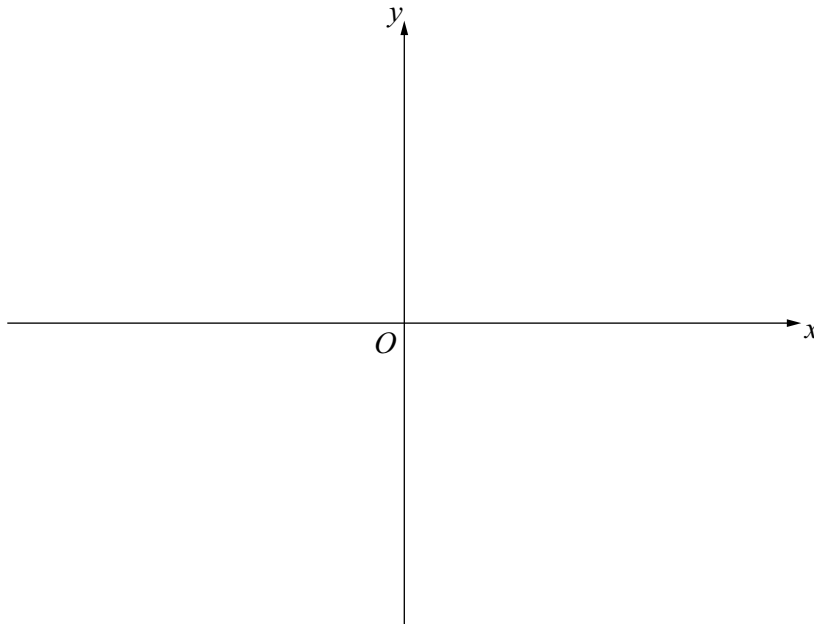
[2]

5   Sketch the graph of $y = x^2 + 2x$.
         On your sketch, write the values where the graph crosses the x-axis and the y-axis.

[3]

6
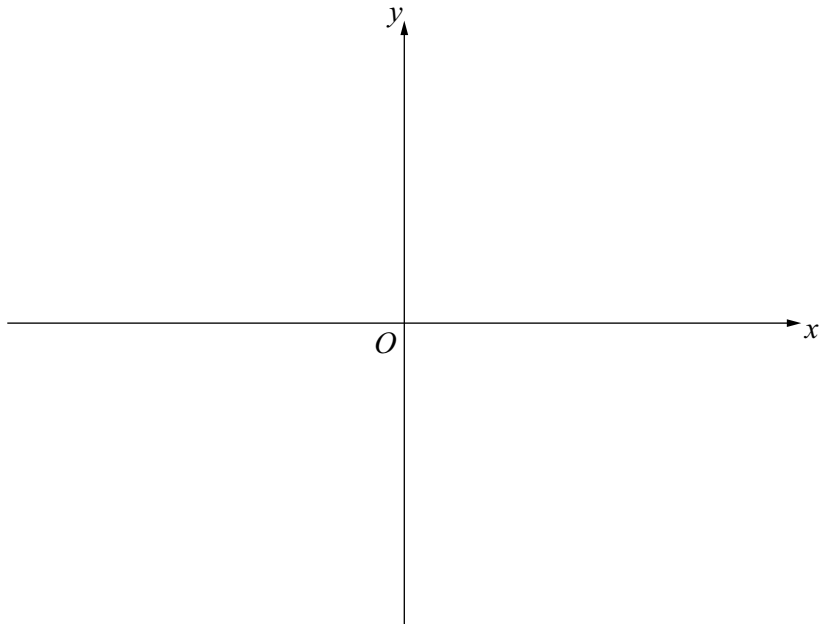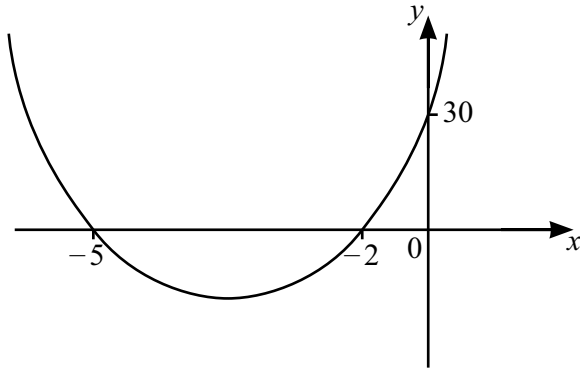
The diagram shows a sketch of the graph of $y = ax^2 + bx + c$.

Find the values of a, b and c.

$a =$ ....

$b =$ ....

$c =$ .... [5]

7 Sketch the graph of $y = x^2 - 3x - 10$.
On your sketch, write the coordinates of any turning points and the values where the graph crosses the
x-axis and the y-axis.
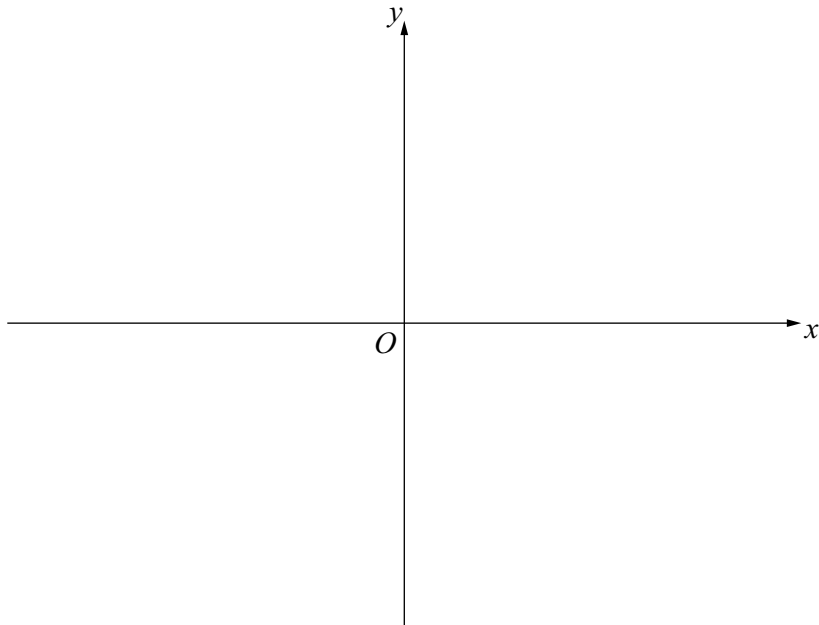
[7]

8 **(a)** Solve the equation $(x - 5)(2x^2 - 18) = 0$.

$x =$ ...., $x =$ ...., $x =$ .... [3]

(b) Sketch the graph of $y = (x - 5)(2x^2 - 18)$.
On your sketch, write the values where the graph crosses the x-axis and the y-axis.
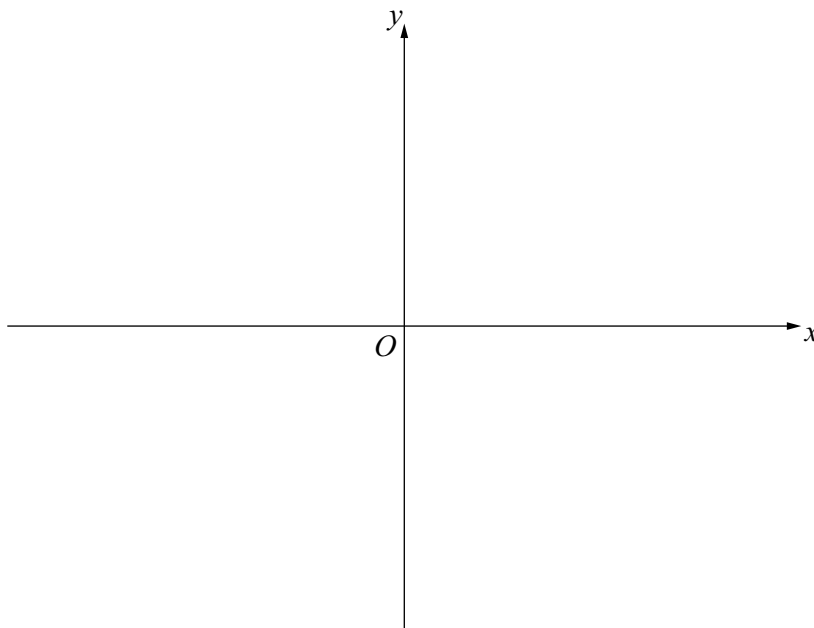
[3]

E2.13 Derivatives

9 $y = 3x^2 - 4x + 7$

Find the derivative of y.

.... [2]

10 $f(x) = 4x^3 - 7x$

Find the gradient of the graph of $f(x)$ at $x = 5$.

.... [4]

11 The derivative of $f(x) = x^3 - 12x + 5$ is $3x^2 - 12$.

Find the coordinates of the turning points of $f(x)$.

(.................., ...)

(.................., ...) [4]

12 A tangent is drawn to the graph of $y = x^2 + 3x$ at the point A.
The gradient of this tangent is -5.

Find the coordinates of point A.

(..................., ...) [6]

13 Find the equation of the tangent to the graph of $y = 3x^2 - 5x + 2$ at $x = -1$.
Give your answer in the form $y = mx + c$.

$y =$ .... [7]

14   A curve has equation $y = x^3 - 6x^2 + 16$.
     Find the coordinates of the two turning points.

(...................., ...)

(...................., ...) [6]

E4.5 Congruence

15
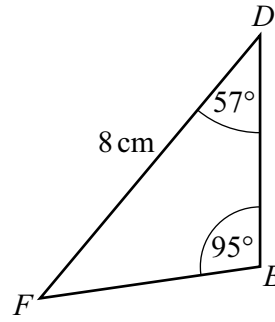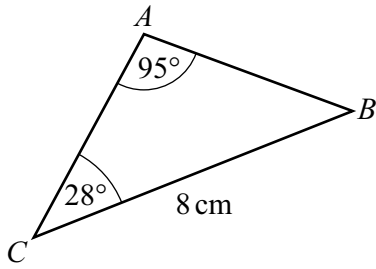
NOT TO
SCALE

Show that these two triangles are congruent.

[2]

16

NOT TO SCALE
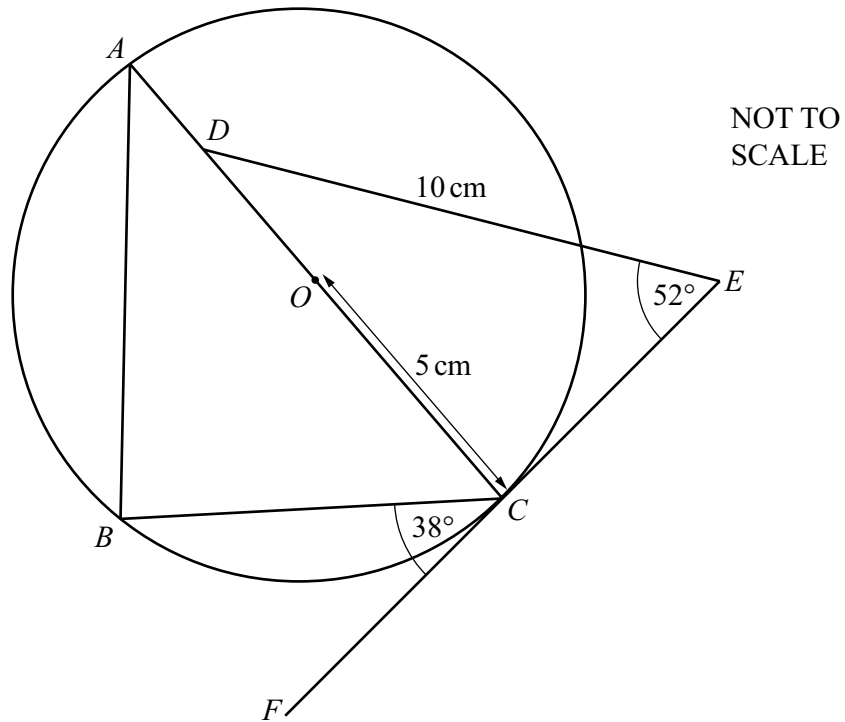
A, *B* and *C* are points on a circle, centre *O*, with radius 5 cm.
AC is a diameter of the circle and point *D* lies on *AC*.
EF is a tangent to the circle at *C*.
DE = 10 cm.

(a) Show that triangle *ABC* is congruent to triangle *DCE*.
Give a geometrical reason for each statement you make.

[6]

(b) Calculate *AD*.

AD = ... cm [3]

E4.7 Alternate segment theorem

17
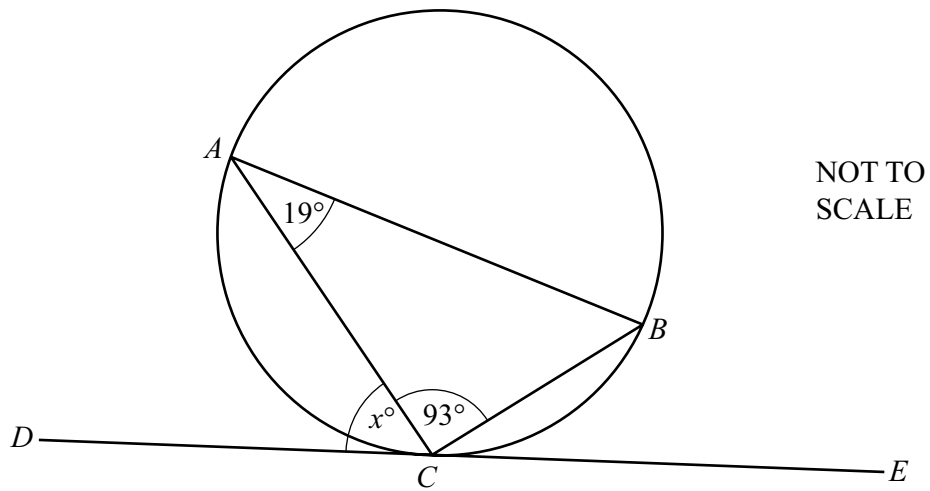
A, *B* and *C* are points on a circle.
DE is a tangent to the circle at *C*.
Angle *BAC* = 19° and angle *ACB* = 93°.

Find the value of *x*.

x = ... [2]

18
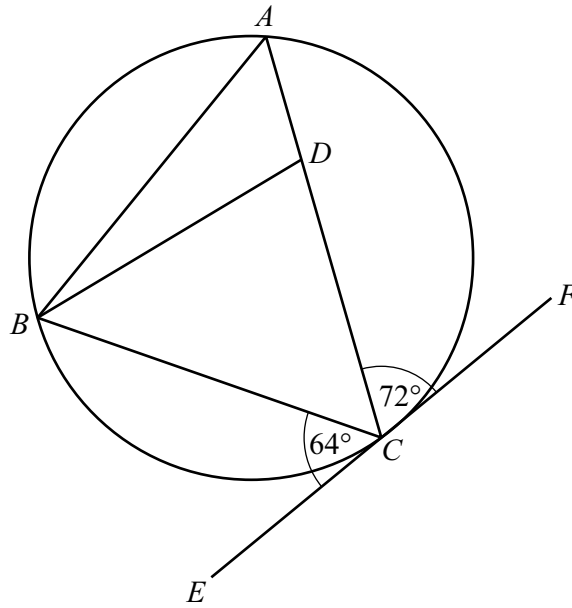
NOT TO
SCALE

A, *B* and *C* are points on a circle.
EF is a tangent to the circle at *C*.
D is a point on *AC*.
Angle *CBD* : Angle *ABD* = 3 : 1 .

Find angle *ADB*.
Give a geometrical reason for each step of your working.

Angle *ADB* = ... [7]

E6.3 Sketch graphs of trigonometric functions, properties of trigonometric functions, solving trigonometric equations

19 Find the coordinates of the two turning points of $y = \sin x$ for $0° \leqslant x \leqslant 360°$.

(...................., ...)

(...................., ...) [2]

20 $\cos 70° = \cos P$ where $180° \leqslant P \leqslant 360°$.

Find the value of P.

$P =$ .... [1]

21 On the axes, sketch the graph of $y = \sin x$ for $0° \leqslant x \leqslant 360°$.
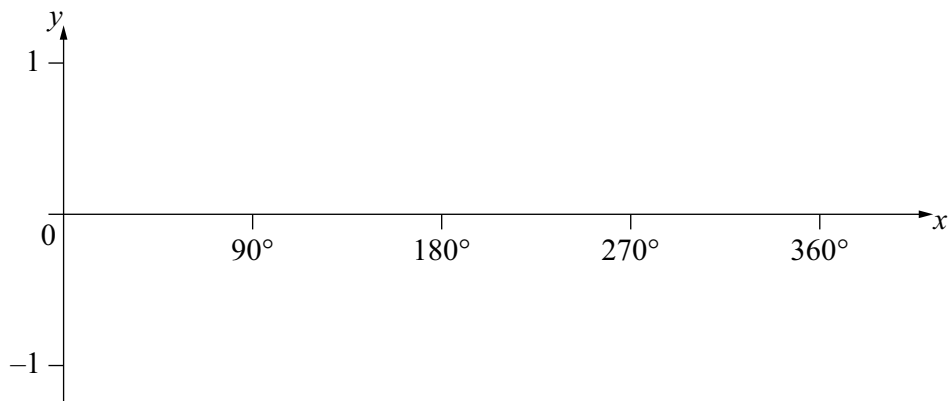
[2]

22 Solve $4\tan x + 3 = -1$ for $0° \leqslant x \leqslant 360°$.

$x =$ .... and $x =$ .... [3]

23 Solve $5 - 2\cos x = 6$ for $180° \leqslant x \leqslant 360°$.

$x =$ .... [3]

24 (a) Complete the table of values for $y = 2\sin 3x$.

x	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
y	0	1	1.7	2		1		−1		−2	−1.7		0

[4]

(b) Draw the graph of $y = 2\sin 3x$ for $0° \leqslant x \leqslant 120°$.
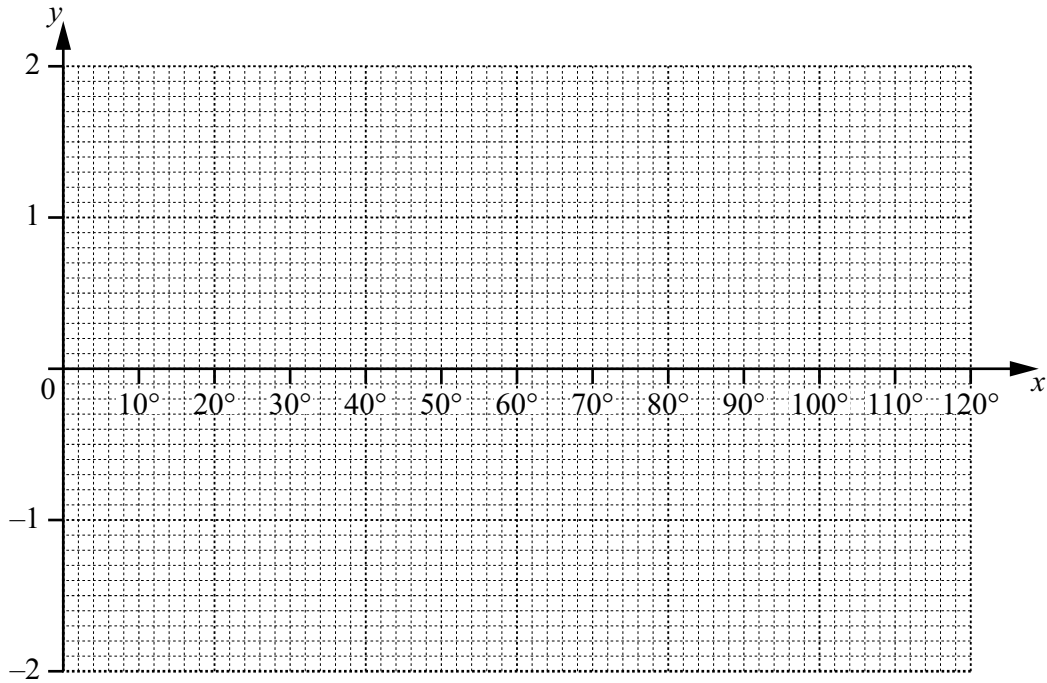
[4]

(c) Use your graph to solve the equation $2\sin 3x = 1.5$.

$x =$ .... or $x =$ .... [2]

E8.6 Conditional probability

25   Two fair dice are rolled.
     The scores on the two dice are added to give the total.

     Given that the score on at least one of the dice is 2, calculate the probability that the total is 5.

     .... [3]

26   The mass, m kg, of each of 100 adults is recorded.
     The table shows this information.

.

Mass (m kg)	$30 < m \leqslant 35$	$35 < m \leqslant 50$	$50 < m \leqslant 70$	$70 < m \leqslant 80$	$80 < m \leqslant 100$
Frequency	7	15	30	36	12

     Three adults are picked at random from those with a mass of 70 kg or less.

     Calculate the probability that one of them has a mass of 35 kg or less and the other two each have a mass greater than 35 kg.

     .... [4]

C9.3 / E9.3 Stem-and-leaf diagrams

27 A group of 12 students each runs 50 metres.

The stem-and-leaf diagram shows the time, in seconds, taken by each student.

6	3
7	1 2 2 5
8	3 4 5 9
9	3 8 9

Key: 7 | 1 = 7.1 seconds

Calculate the mean time.

.... s [2]

28 Some people are asked about how much money, in dollars, they spent on their mobile phone last month.

The stem-and-leaf diagram shows this information.

1	1 2 3 5 8 8 9
2	2 3 5 6 6 7 9
3	3 5 5 9
4	0 1 2 3
5	0 3 8
6	4

Key: 2 | 3 = $ 23

(a) Find the number of people asked.

.... [1]

(b) Find the median amount spent.

$ .... [1]

(c) Calculate the percentage of people who spent more than $40.

....% [2]

E9.6 Box-and-whisker plots

29 The mass, in kg, of each of 15 parcels is recorded below.

4.90	5.10	5.25	5.30	5.40
5.45	5.55	5.55	5.60	5.75
5.80	5.95	6.15	6.25	6.50

On the grid, draw a box-and-whisker plot to show this data.
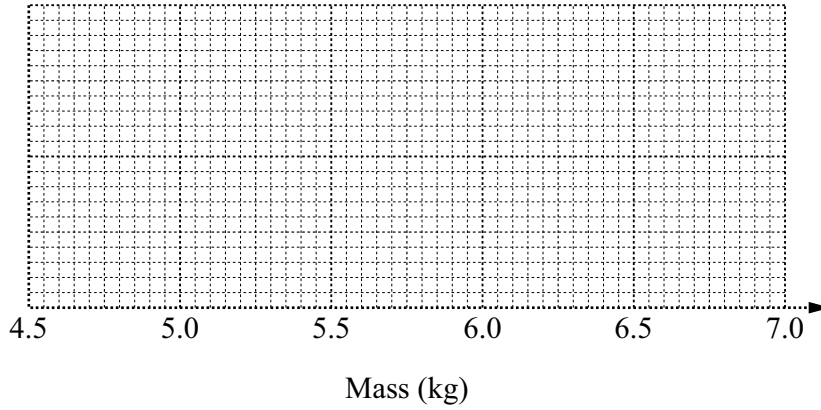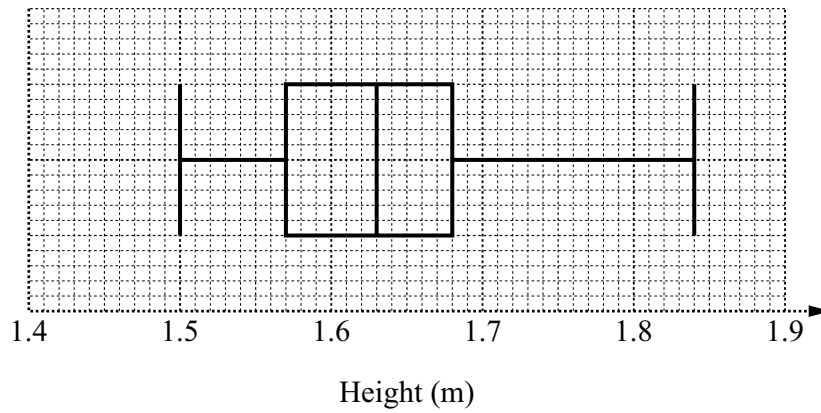
Mass (kg)

[4]

30

Height (m)

The box-and-whisker plot shows information about the heights, in metres, of a group of 15-year old boys.

(a) (i) Find the range.

.... m [1]

(ii) Find the median.

.... m [1]

(b)
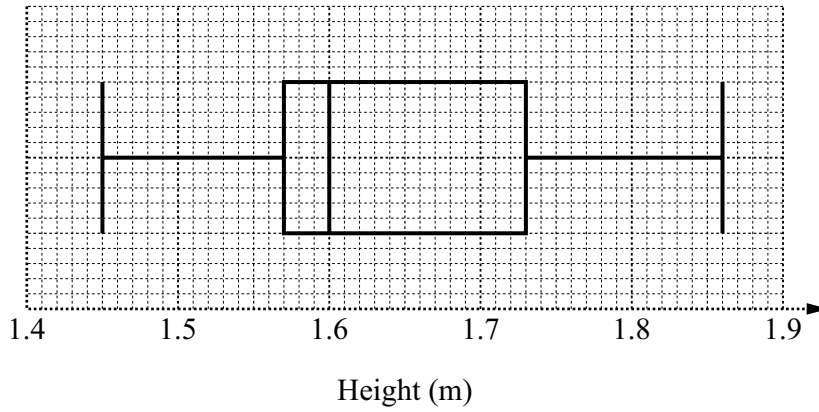
Height (m)

The box-and-whisker plot shows information about the heights, in metres, of a group of 15-year old girls.

Make two comparisons between the distributions for the heights of the boys and the heights of the girls.
You must use statistics to support your comparisons.

1 ....

....

2 ....

.... [4]

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

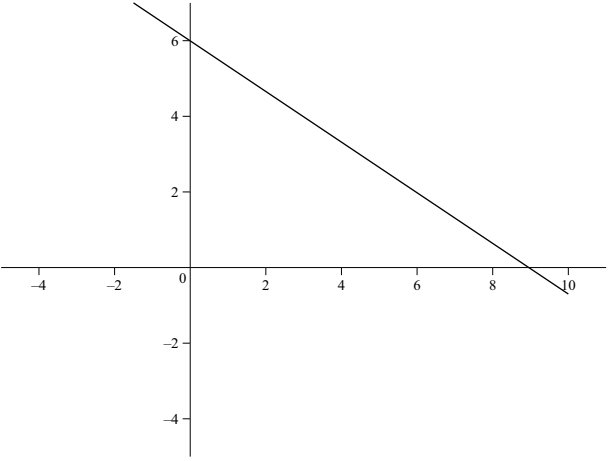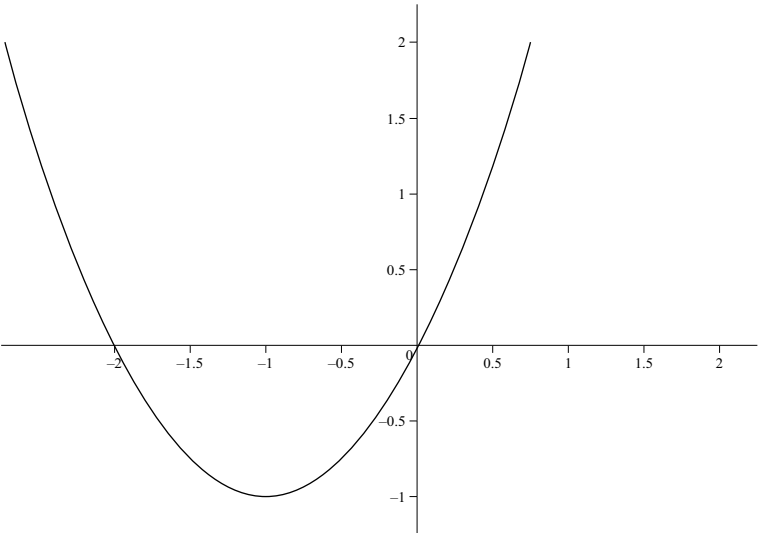| |
|---|
| GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

• the specific content of the mark scheme or the generic level descriptors for the question
• the specific skills defined in the mark scheme or in the generic level descriptors for the question
• the standard of response required by a candidate as exemplified by the standardisation scripts. |
| GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions). |
| GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

• marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
• marks are awarded when candidates clearly demonstrate what they know and can do
• marks are not deducted for errors
• marks are not deducted for omissions
• answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous. |
| GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors. |
| GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen). |

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.
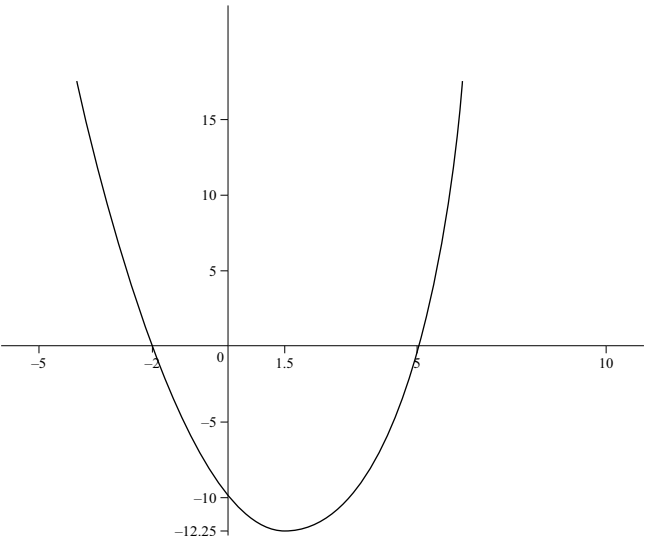
Maths-Specific Marking Principles
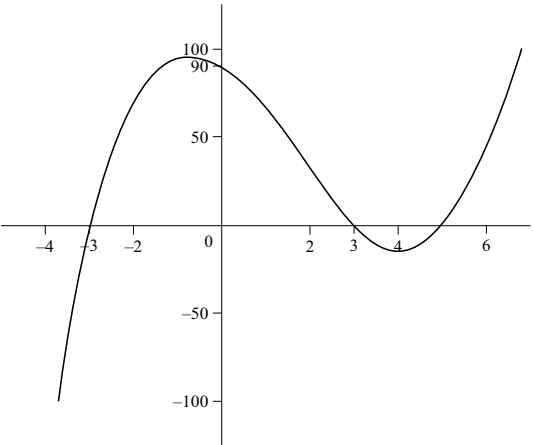
1. Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.

2. Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.

3. Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.

4. Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).

5. Where a candidate has misread a number in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 mark for the misread.

6. Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

cao   correct answer only
dep   dependent
FT   follow through after error
isw   ignore subsequent working
oe   or equivalent
SC   Special Case
nfww   not from wrong working
soi   seen or implied

Question	Answer	Marks	Partial Marks
1	$x^2 = 3x - 2$ or better	**M1**	
	$(x-2)(x-1)$	**M1**	FT *their* 3 term quadratic – e.g. use of formula or complete square
	$[x =] 1, [y =] 1$ $[x =] 2, [y =] 4$	**B2**	**B1** for each correct pair or for $x = 1$ and $x = 2$
2	$3x^2 + 9x - 14 = 0$	**B2**	**B1** for $y = 10 - 2x$
	$\dfrac{-9 \pm \sqrt{9^2 - 4 \times 3 \times -14}}{6}$	**M2**	**FT** correct substitution seen for *their* 3 term quadratic **B1FT** for $\sqrt{9^2 - 4 \times 3 \times -14}$ or $\dfrac{-9 + \sqrt{}}{2 \times 3}$ or $\dfrac{-9 - \sqrt{}}{2 \times 3}$
	1.13 or 1.129… and –4.13 or –4.129…	**B2**	**B1** for each If 0 scored **SC1** for 4.13 or 4.129... and –1.13 or –1.129…
	(1.13, 7.74) and (–4.13, 18.26)	**B1**	Allow 18.3 for 18.26
3(a)	E	**1**	
3(b)	F	**1**	
3(c)	B	**1**	
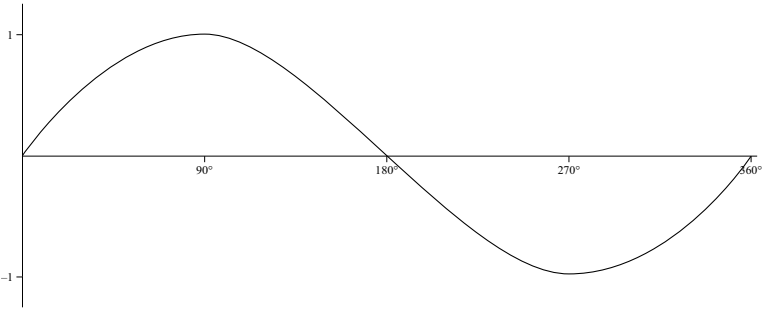
Question	Answer	Marks	Partial Marks
4	Correct ruled sketch with $y = 6$ and $x = 9$ indicated as intercepts with axes	2	**B1** for ruled line with negative gradient
5	Correct sketch with $x = -2$ and $(0, 0)$ indicated as intercepts with x-axis	3	**B1** for U-shaped curve **B1** for $x(x + 2)$ [$= 0$] or better

Question	Answer	Marks	Partial Marks
6	[$a =$] 3 [$b =$] 21 [$c =$] 30	5	**B4** for $a = 3$ and $b = 21$ or **B3** for $c = 30$ and either $a = 3$ or $b = 21$ OR **B1** for $c = 30$ soi **M1** for $(x + 5)(x + 2)$ seen isw **A1** for $x^2 + 2x + 5x + 10$ or better seen isw **M1** for recognising multiplier of 3 oe OR **B1** for $c = 30$ soi **M1** for $(-2)^2 a - 2b + 30 = 0$ oe **and** $(-5)^2 a - 5b + 30 = 0$ oe **M1** for correctly eliminating one variable **A1** for $a = 3$ or $b = 21$
7	Correct sketch with curve crossing axes at $x = -2$, $x = 5$ and $y = -10$ and turning point at $(1.5, -12.25)$ oe indicated 	7	**B2** for $x = -2$, $x = 5$ soi or **M1** for $(x - 5)(x + 2)$ oe **B3** for turning point at $(1.5, -12.25)$ or **B2** for $x = 1.5$ or **M1** for $(x - 1.5)^2$ or $2x - 3$ seen **B1** for y-intercept of *their* sketch at -10 **B1** for U-shaped curve

Question	Answer	Marks	Partial Marks
8(a)	5, 3 and –3	3	**B1** for each OR **M2** for $[2](x-5)(x-3)(x+3)$ $[=0]$ or for $x=5$ and $x^2=9$ or **M1** for $[2](x^2-9)(x-5)$ or for $x-5=0$ and $2x^2-18=0$
8(b)	Correct sketch and with *x*-intercepts indicated at –3, 3 and 5 and *y*-intercept at 90 	3	**B1** for positive cubic curve **B1** for *y*-intercept at 90 soi **B1FT** for *their* 3 roots from **part (a)** indicated on sketch
9	$6x-4$	2	**B1** for each term
10	293	4	**B2** for $12x^2-7$ or **B1** for each correct term **M1** for substituting $x=5$ into *their* derivative
11	(2, –11) and (–2, 21)	4	**B3** for one correct pair of coordinates or for $x=2$ and $x=-2$ or **M2** for $x^2=4$ or better or **M1** for $3x^2-12=0$

Question	Answer	Marks	Partial Marks
12	$(-4, 4)$	6	**B4** for $x = -4$ or **M3** for $2x + 3 = -5$ OR **B2** for $2x + 3$ or **B1** for either $2x$ or 3 **M1** for *their* derivative $= -5$ (*their* derivative must be in terms of x) AND **M1** for substituting *their* x into $y = x^2 + 3x$
13	$y = -11x - 1$	7	**B2** for $6x - 5$ or **B1** for one correct term **B2** for gradient $= -11$ or **M1** for substituting $x = -1$ into *their* derivative **B1** for $(-1, 10)$ soi **M1** for substituting $(-1,$ *their* $10)$ into $y =$ *their* $mx + c$
14	$\left(\dfrac{1}{3}, -\dfrac{23}{27}\right)$ oe and $(-5, 75)$	6	**B5** for one pair of coordinates or for $x = \dfrac{1}{3}$ oe and $x = -5$ OR **B3** for $(3x - 1)(x + 5)$ or **B2** for $3x^2 + 14x - 5$ or **B1** for 1 or 2 terms correct in $3x^2 + 14x - 5$ **M1** for *their* dy/d$x = 0$ **M1** for attempted solution of *their* 3-term quadratic
15	$180 - 95 - 28 = 57$ or $180 - 95 - 57 = 28$	**M1**	
	ASA oe	**A1**	

Question	Answer	Marks	Partial Marks
16(a)	$AC = ED$ [= 10 cm] given Angle ABC = 90 angle in semicircle Angle DCE = 90 angle between tangent and radius = 90 Angle BAC = 38 alternate segment Angle CDE = 38 angles in a triangle	**M5**	**M1** for each correct statement with reason or angle ACB = 52 angle between tangent and radius = 90 and angle BAC = 38 angles in a triangle Accept other equivalent arguments with reasons If 0 scored, **SC1** for 3 correct pairs of sides or angles with no/ incorrect reasons
	[congruent] ASA oe	**A1**	
16(b)	2.12	**3**	**B2** for CD = 7.88 or **M1** for $\dfrac{CD}{10} = \sin 52$ oe or better
17	68	**2**	**M1** for angle BCE = 19 or angle ABC = 68
18	Angle ABC = 72 Alternate segment OR Angle BCD = 44 Angles on a straight line	**B2**	**B1** for angle and **B1** for reason
	Angle ABD = 72 ÷ (1 + 3) or angle DBC = 72 ÷ (1 + 3) × 3	**M1**	Allow for correct use of *their* 72
	Angle BAD = 64 Alternate segment OR Angle BDC = 82 Angles in a triangle	**B2**	**B1** for angle and **B1** for reason
	Angle ADB = 98 Angles in a triangle or angles on a straight line (if using angle BDC)	**B2**	**B1** for angle and **B1** for reason
19	(90, 1) and (270, –1)	**2**	**B1** for each coordinate pair or for both *x*-values or for both *y*-values
20	290	**1**	

Question	Answer	Marks	Partial Marks
21	Correct sketch 	2	**B1** for correct shape passing through (0, 0)
22	135 and 315	3	**B2** for one correct or **M1** for $\tan x = -1$ or better
23	240	3	**B2** for $x = 120$ or **M1** for $\cos x = -0.5$ or better
24(a)	1.7, 0, –1.7, –1	4	**B1** for each
24(b)	Correct graph	4	**B3FT** for 12 or 13 correct plots or **B2FT** for 10 or 11 correct plots or **B1FT** for 8 or 9 correct plots
24(c)	15 to 17 and 43 to 45	2	**FT** *their* curve intersection with $y = 1.5$ **B1FT** for each
25	$\dfrac{2}{11}$ oe	3	**B1** for 11 'pairs' with 2 on one of the dice soi **B1** for 2 required outcomes giving total of 5 soi

Question	Answer	Marks	Partial Marks
26	$\dfrac{693}{2210}$ oe	4	**M3** for $3 \times \dfrac{7}{52} \times \dfrac{45}{51} \times \dfrac{44}{50}$ oe or **M2** for $\dfrac{7}{52} \times \dfrac{45}{51} \times \dfrac{44}{50}$ oe or **M1** for one correct probability e.g. $\dfrac{7}{52}$ or $\dfrac{45}{51}$ or $\dfrac{44}{50}$ oe seen (could be $\dfrac{45}{52}$ or $\dfrac{44}{51}$ or $\dfrac{7}{50}$ or $\dfrac{45}{52}$ or $\dfrac{7}{52}$ or $\dfrac{44}{50}$) oe If 0 scored, **SC1** for final answer $\dfrac{14175}{140608}$ oe
27	8.2	2	**B1** for answer figs 82 or for [total =] 98.4 or **M1** for *their* total ÷ 12
28(a)	26	1	
28(b)	28	1	
28(c)	26.9 or 26.92...	2	**M1** for $\dfrac{7}{26}$ oe FT *their* **(a)**
29	Correct box plot	4	**B1** for minimum at 4.90 and maximum at 6.50 **B1** for LQ at 5.30 and UQ at 5.95 **B1** for median at 5.55 **B1** for *their* correctly drawn box plot
30(a)(i)	[0].34	1	
30(a)(ii)	1.63	1	
30(b)	The boys are taller oe nfww and median for girls is 1.6 and median for boys is *their* 1.63	B2	**FT** *their* **(a)(ii)** **B1** for each *their* 1.63 must be greater than 1.6
	The girls' heights are less consistent oe nfww and IQR for girls is 0.16 and IQR for boys is 0.11	B2	**B1** for each Accept girls' IQR is bigger as the box is longer oe Accept range for girls is 0.41 and range for boys is *their* 0.34 where *their* 0.34 is less than 0.41