

For OCR

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
MATHEMATICS**

Higher Paper 3A

Marking Guide

Method marks (M) are awarded for knowing and using a correct method.

Accuracy marks (A) are awarded for correct answers, having used a correct method.

(B) marks are independent of method marks.



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### Higher Tier Paper 3A Marking Guide

1.  $\angle ACB = \angle ABC = 34$  B1  
 $\angle BAC = 180 - (34 + 34) = 112$  M1  
 $x = 360 - 112 = 248^\circ$  A1 Total 3

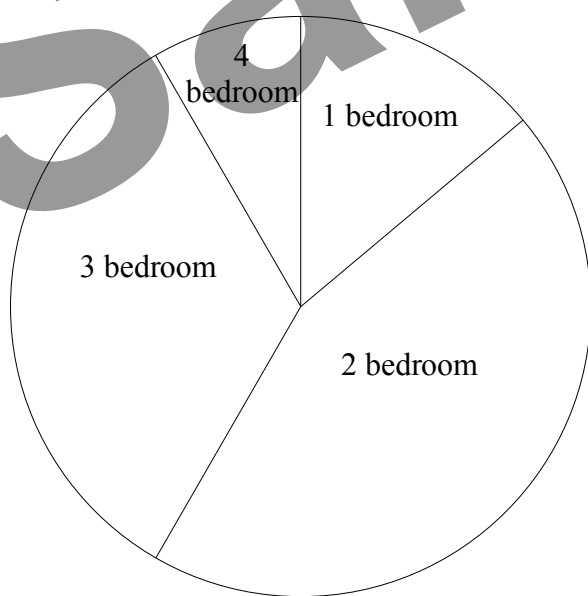
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2. (a)  $\begin{array}{cccc} 56 & 28 & 14 & 7 \\ 2 & 2 & 2 & \\ 56 = 2^3 \times 7 & & & \end{array}$  M1  
A1

(b)  $\begin{array}{cccc} 84 & 42 & 21 & 7 \\ 2 & 2 & 3 & \\ 84 = 2^2 \times 3 \times 7 & & & \\ \text{HCF} = 2^2 \times 7 = 28 & & & \end{array}$  M1  
A1 Total 4

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3.  $360 \div 720 = \frac{1}{2}$   
multiply by  $\frac{1}{2}$  to get angles:  $50^\circ, 160^\circ, 120^\circ, 30^\circ$  M1 A1

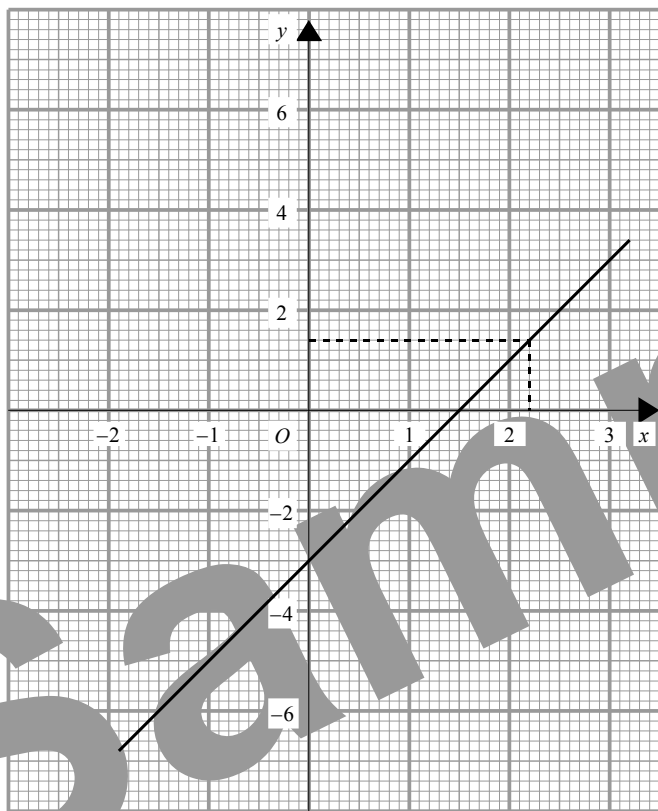


B2

Total 4

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4. (a)



B3

(b)  $x = 2.2$

B1

Total 4

5. (a)  $5 + 6 + 7 = 18$   
 $36 \div 18 = 2$   
 $6 \times 2 = 12$

M1  
M1  
A1

(b) 1 hour =  $3 \times 20$  mins  
average speed =  $3 \times 5 = 15$  km/h

M1  
A1

Total 5

6. by alternate angles,  $\angle XYS = \angle YXN = 115$   
bearing =  $180 + 115 = 295^\circ$

M1  
A1

Total 2

7. (a)  $10\% = 28p$ ,  $5\% = 14p$ ,  $2\frac{1}{2}\% = 7p$   
VAT =  $28p + 14p + 7p = 49p$   
total cost =  $\pounds 2.80 + 49p = \pounds 3.29$

M1  
M1  
A1

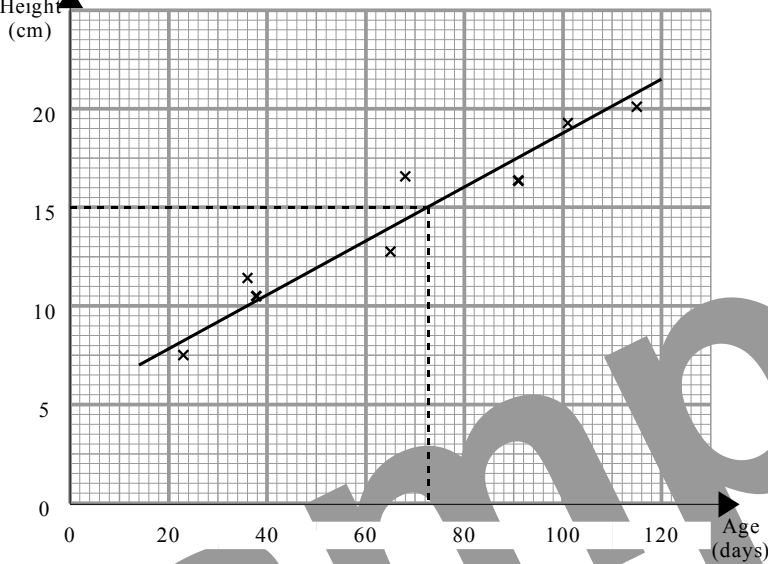
(b)  $470 \div 40 = 11.7\dots$   
 $\therefore$  should buy 12 boxes

M1  
A1

Total 5

8.

(a) Height (cm)



B1

(b) positive

B1

(c) (i) line of best fit  
from graph (about 72 days)

M1

A1

(ii) 24 cm is outside range of the data  
relationship may not be valid

B1

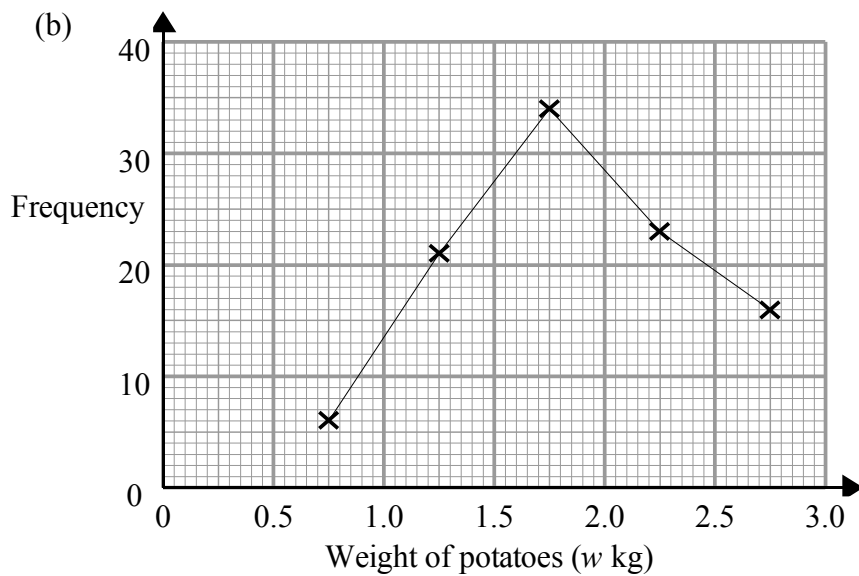
Total 5

9.

(a) 16%

B1

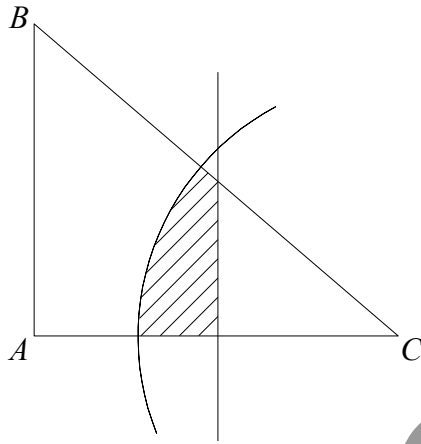
(b)



B2

Total 3

10.



perpendicular bisector of  $AC$   
 arc, centre  $C$ , radius 5 cm  
 accurate line and arc  
 correct region shaded

M1  
 M1  
 A1  
 A1

Total 4

11. (a) length  
 (b) volume  
 (c) area

B1  
 B1  
 B1

Total 3

12. (a)  $4a^2$   
 (b)  $x^4$   
 (c)  $3y^3 - 2y^2$   
 (d)  $4p + 9 = -3$   
 $4p = -12$   
 $p = -3$

B1  
 B1  
 B1  
 M1  
 M1  
 A1

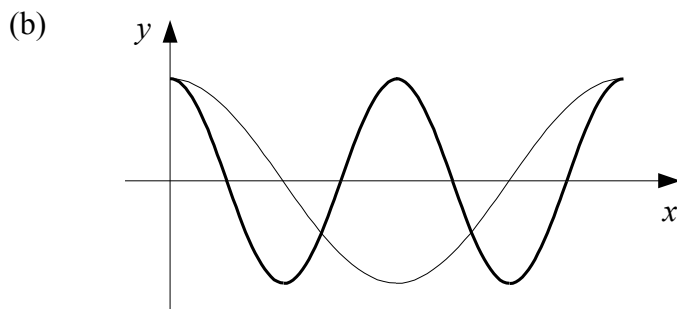
(e)  $= (x - 4)^2 - 16 + 19$   
 $= (x - 4)^2 + 3$        $a = -4, b = 3$

M1 A1  
 A1

Total 9

13. (a) (i)  $(90, 0)$   
 (ii)  $(180, -1)$

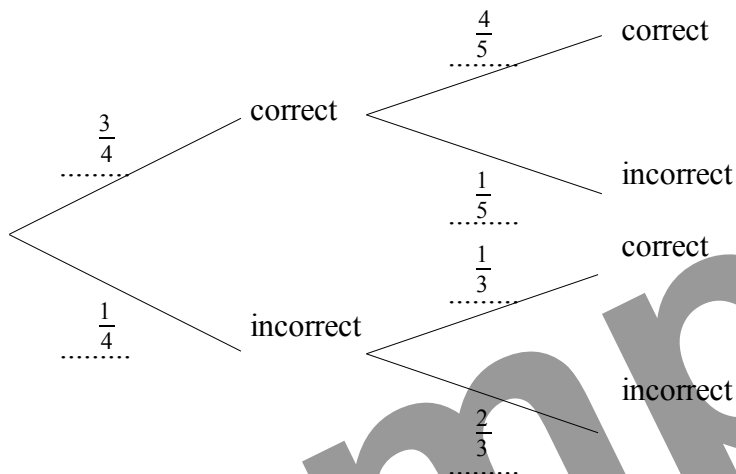
B1  
 B1  
 B2



Total 4

14.	$P + l = 2\pi r + 5r$ $P + l = r(2\pi + 5)$ $r = \frac{P + l}{2\pi + 5}$	M1 M1 A1	Total 3
15.	<p>(a) <math>x + x^2 + (3x - 2) = 30</math>  <math>x^2 + 4x - 2 = 30</math>  <math>x^2 + 4x - 32 = 0</math></p> <p>(b) <math>(x + 8)(x - 4) = 0</math>  <math>x = -8</math> (can't have age <math>-8</math>) or <math>4</math>  when <math>x = 4</math>, ages are <math>4, 16</math> and <math>10</math> <math>\therefore</math> oldest is <math>16</math> years</p>	M1 A1 M1 A1 A1	Total 5
16.	<p>(a) <math>\approx \frac{900 \times 30}{3^2}</math>  <math>= 100 \times 30</math>  <math>= 3000</math></p> <p>(b) <math>\frac{1}{3}</math></p> <p>(c) <math>= \frac{18}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}</math>  <math>= \frac{18\sqrt{3}}{3} = 6\sqrt{3}</math></p>	M1 M1 A1 B1 M1 A1	Total 6
17.	let smallest number be $2n$ where $n$ is an integer next two are $2n + 2$ and $2n + 4$ sum is $2n + 2n + 2 + 2n + 4$ $= 6n + 6 = 6(n + 1)$ which is a multiple of $6$	M1 M1 A1	Total 3
18.	<p>(a) (approx) <math>-1.45</math> or <math>2.45</math></p> <p>(b) <math>2x - 2x^2 = 1 \Leftrightarrow 7 + 2x - 2x^2 = 8</math>  the curve does not intersect <math>y = 8</math> <math>\therefore</math> no solutions</p>	B1 M1 A1	Total 3

19. (a) part (i) part (ii) B3



(b)  $= \frac{3}{4} \times \frac{4}{5} = \frac{3}{5}$  M1 A1

(c) P(both incorrect) =  $\frac{1}{4} \times \frac{2}{3} = \frac{1}{6}$  M1

P(at least one correct) =  $1 - \frac{1}{6} = \frac{5}{6}$  A1

estimate =  $\frac{5}{6} \times 180 = 150$  M1 A1

Total 9

20. volume of cylinder =  $\pi r^2 h$  B1

volume of cone =  $\frac{1}{3} \pi (2r)^2 H = \frac{4}{3} \pi r^2 H$  M1

$\pi r^2 h = 2 \times \frac{4}{3} \pi r^2 H$  M1

$h = \frac{8}{3} H \therefore H = \frac{3}{8} h$  A1

Total 4

21. (a)  $OP$  is radius and  $PQ$  is tangent  $\therefore \angle OPQ = 90^\circ$  B1  
 $\angle ORP = \angle OPQ$  and  $\angle POQ$  is common M1  
 angle sum of triangle =  $180^\circ \therefore \angle OQP = \angle OPR$   
 three equal angles  $\therefore$  triangles  $OPR$  and  $OPQ$  are similar A1

(b)  $OQ^2 = OP^2 + PQ^2 = 5^2 + 12^2 = 169$  M1

$OQ = 13$  A1

$\frac{OR}{OP} = \frac{OP}{OQ}$  M1

$\frac{OR}{5} = \frac{5}{13} \therefore OR = \frac{25}{13}$  cm A1

Total 7

22.  $(x - 1)^2 + (x + 1)^2 = 10^2$  M1

$x^2 - 2x + 1 + x^2 + 2x + 1 = 100$  M1

$2x^2 + 2 = 100$

$x^2 = 49$  A1

$x = \pm 7$ , must be +7 for lengths to be positive

rectangle measures 6 cm by 8 cm M1

area =  $6 \times 8 = 48$  cm<sup>2</sup> A1

Total 5

**TOTAL FOR PAPER: 100 MARKS**