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0580/22

October/November 2009

1 hour 30 minutes

Additional Materials:	Electronic calculator	Geometrical instruments
	Mathematical tables (optional)	Tracing paper (optional)

The total of the marks for this paper is 70.



[Turn over

1

For
Examiner's
Use

For the diagram above write down

(a) the order of rotational symmetry,

Answer(a) [1]

(b) the number of lines of symmetry.

Answer(b) [1]

2 Write down the next two prime numbers after 31.

Answer and [2]

3 Use your calculator to find the value of $\frac{(\cos 30^\circ)^2 - (\sin 30^\circ)^2}{2(\sin 120^\circ)(\cos 120^\circ)}$.

Answer [2]

4 Simplify $\frac{5}{8}x^{\frac{3}{2}} \div \frac{1}{2}x^{-\frac{5}{2}}$.

Answer [2]

- 5 In 1977 the population of China was 9.5×10^8 .
 In 2007 the population of China was 1.322×10^9 .
 Calculate the population in 2007 as a percentage of the population in 1977.

For
Examiner's
Use

Answer % [2]

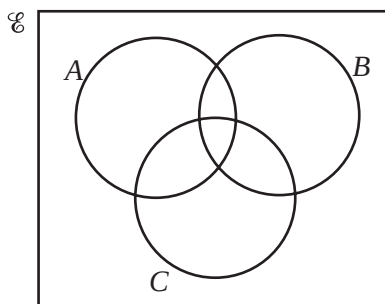
6

$$\mathbf{A} = \begin{pmatrix} 0 & 1 \\ -4 & -12 \end{pmatrix} \quad \mathbf{B} = \begin{pmatrix} 3 & 4 \\ 0 & -4 \end{pmatrix}$$

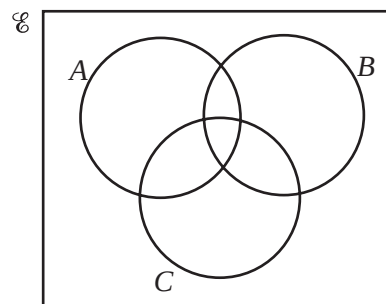
Calculate the value of $5|\mathbf{A}| + |\mathbf{B}|$, where $|\mathbf{A}|$ and $|\mathbf{B}|$ are the determinants of $\mathbf{A}$ and $\mathbf{B}$.

Answer [2]

- 7 Shade the region required in each Venn Diagram.



$$B' \cap (A \cap C)$$



$$B' \cap (A \cup C)$$

[2]

- 8 Find the length of the line joining the points $A(-2, 10)$ and $B(-8, 2)$.

For
Examiner's
Use

Answer $AB =$ [2]

- 9 Solve the simultaneous equations

$$\begin{aligned} 6x + 18y &= 57, \\ 2x - 3y &= -8. \end{aligned}$$

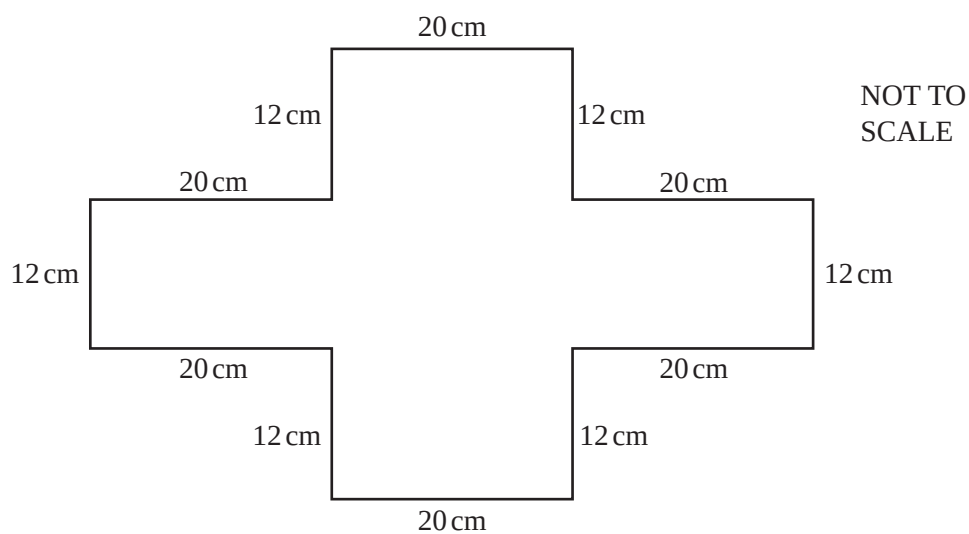
Answer $x =$
 $y =$ [3]

- 10 The braking distance, d , of a car is directly proportional to the square of its speed, v .
 When $d = 2$, $v = 5$.
 Find d when $v = 40$.

Answer $d =$ [3]

11

For
Examiner's
Use



Each of the lengths 20 cm and 12 cm is measured correct to the nearest centimetre.
Calculate the upper bound for the perimeter of the shape.

Answer cm [3]

12 Simplify $16 - 4(3x - 2)^2$.

Answer [3]

- 13 Solve the inequality $6(2 - 3x) - 4(1 - 2x) \leq 0$.

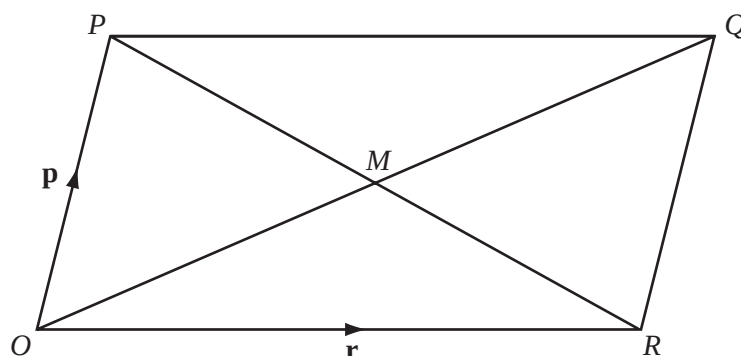
For
Examiner's
Use

Answer [3]

- 14 Zainab borrows \$249 from a bank to pay for a new bed.
The bank charges compound interest at 1.7% per month.
Calculate how much **interest** she owes at the end of 3 months.
Give your answer correct to 2 decimal places.

Answer \$ [3]

15



O is the origin and $OPQR$ is a parallelogram whose diagonals intersect at M .

The vector $\vec{OP}$ is represented by $\mathbf{p}$ and the vector $\vec{OR}$ is represented by $\mathbf{r}$.

- (a) Write down a single vector which is represented by

(i) $\mathbf{p} + \mathbf{r}$,

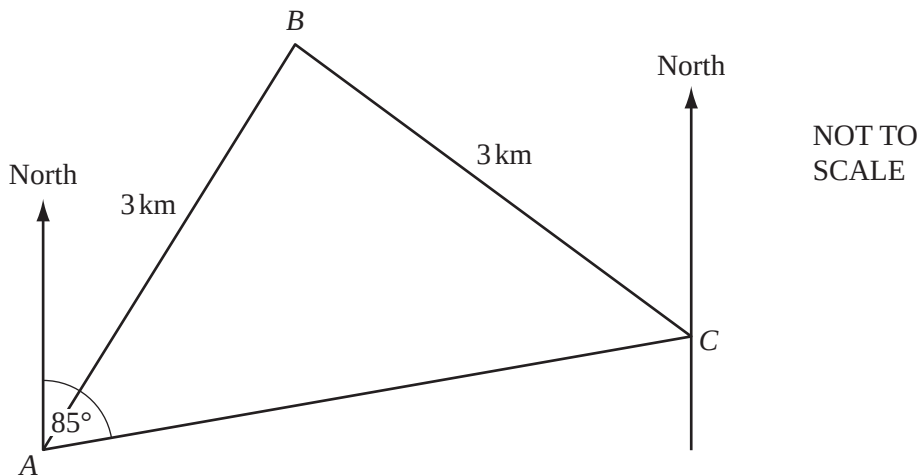
Answer(a)(i) [1]

(ii) $\frac{1}{2}\mathbf{p} - \frac{1}{2}\mathbf{r}$.

Answer(a)(ii) [1]

- (b) On the diagram, mark with a cross (x) and label with the letter S the point with position vector $\frac{1}{2}\mathbf{p} + \frac{3}{4}\mathbf{r}$. [2]

16

For
Examiner's
Use

A , B and C are three places in a desert. Tom leaves A at 06 40 and takes 30 minutes to walk directly to B , a distance of 3 kilometres. He then takes an hour to walk directly from B to C , also a distance of 3 kilometres.

- (a) At what time did Tom arrive at C ?

Answer (a) [1]

- (b) Calculate his average speed for the whole journey.

Answer (b) km/h [2]

- (c) The bearing of C from A is 085° .
Find the bearing of A from C .

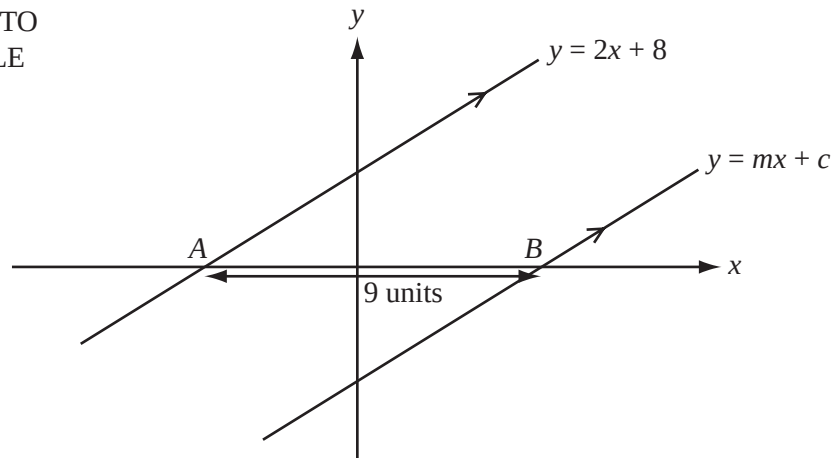
Answer (c) [1]

- 17 (a) In 2007, a tourist changed 4000 Chinese Yuan into pounds (£) when the exchange rate was £1 = 15.2978 Chinese Yuan.
Calculate the amount he received, giving your answer correct to 2 decimal places.

Answer(a) £ [2]

- (b) In 2006, the exchange rate was £1 = 15.9128 Chinese Yuan.
Calculate the percentage decrease in the number of Chinese Yuan for each £1 from 2006 to 2007.

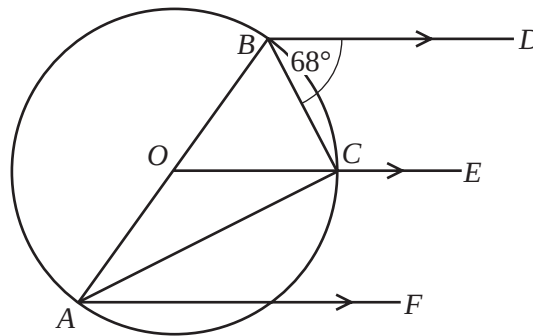
Answer(b) % [2]

NOT TO
SCALE

The line $y = mx + c$ is parallel to the line $y = 2x + 8$.
The distance AB is 9 units.

Find the value of m and the value of c .

Answer $m =$ and $c =$ [4]

NOT TO
SCALE

Points A , B and C lie on a circle, centre O , with diameter AB .
 BD , CE and AF are parallel lines.
 Angle $CBD = 68^\circ$.

Calculate

(a) angle BOC ,

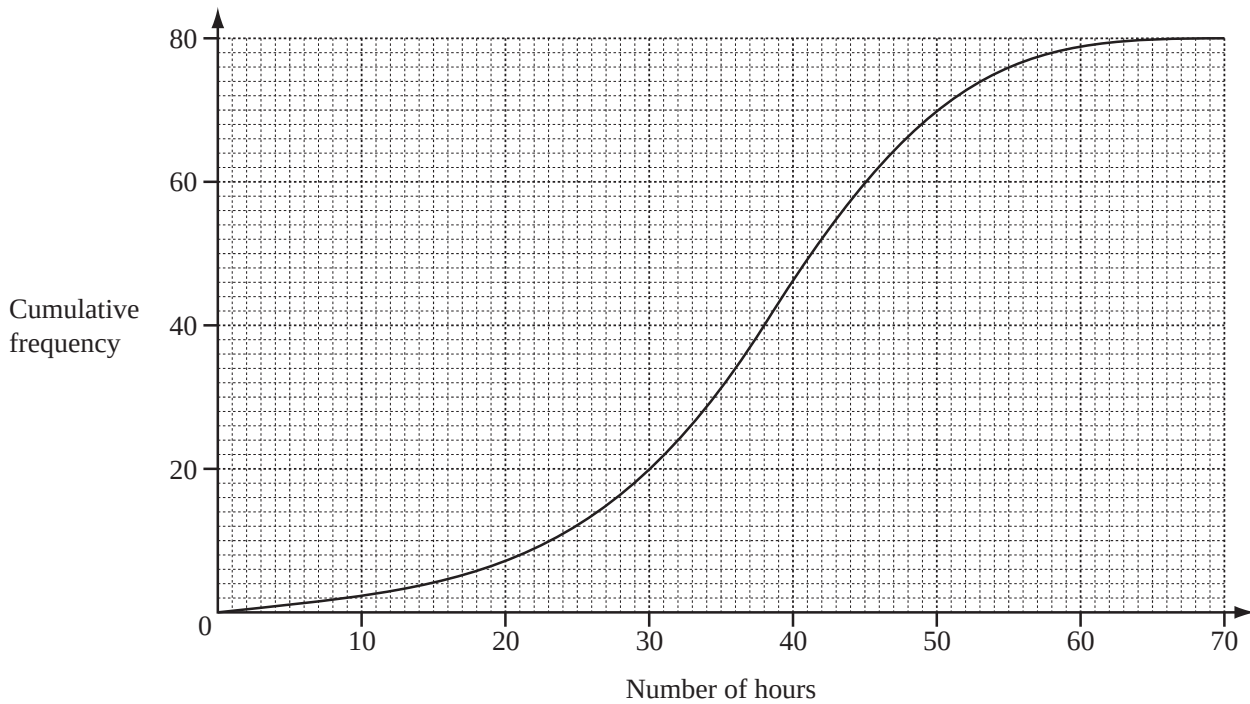
Answer(a) Angle $BOC =$ [2]

(b) angle ACE .

Answer(b) Angle $ACE =$ [2]

- 20 The number of hours that a group of 80 students spent using a computer in a week was recorded. The results are shown by the cumulative frequency curve.

For
Examiner's
Use



Use the cumulative frequency curve to find

- (a) the median,

Answer(a) h [1]

- (b) the upper quartile,

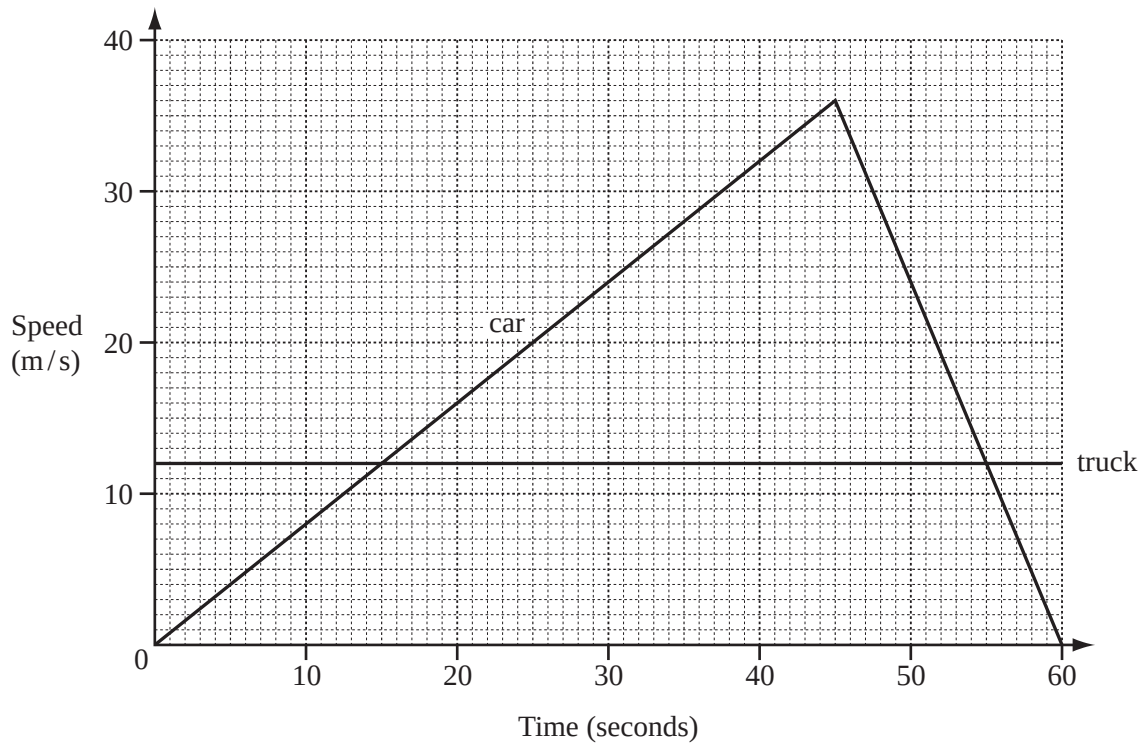
Answer(b) h [1]

- (c) the interquartile range,

Answer(c) h [1]

- (d) the number of students who spent more than 50 hours using a computer in a week.

Answer(d) [2]



The graph shows the speed of a truck and a car over 60 seconds.

- (a) Calculate the acceleration of the car over the first 45 seconds.

Answer(a) m/s^2 [2]

- (b) Calculate the distance travelled by the car while it was travelling faster than the truck.

Answer(b) m [3]

Question 22 is printed on the next page.

22

$$f(x) = 4x + 1$$

$$g(x) = x^3 + 1$$

$$h(x) = \frac{2x+1}{3}$$

For
Examiner's
Use

(a) Find the value of $gf(0)$.

Answer(a) [2]

(b) Find $fg(x)$. Simplify your answer.

Answer(b) [2]

(c) Find $h^{-1}(x)$.

Answer(c) [2]

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