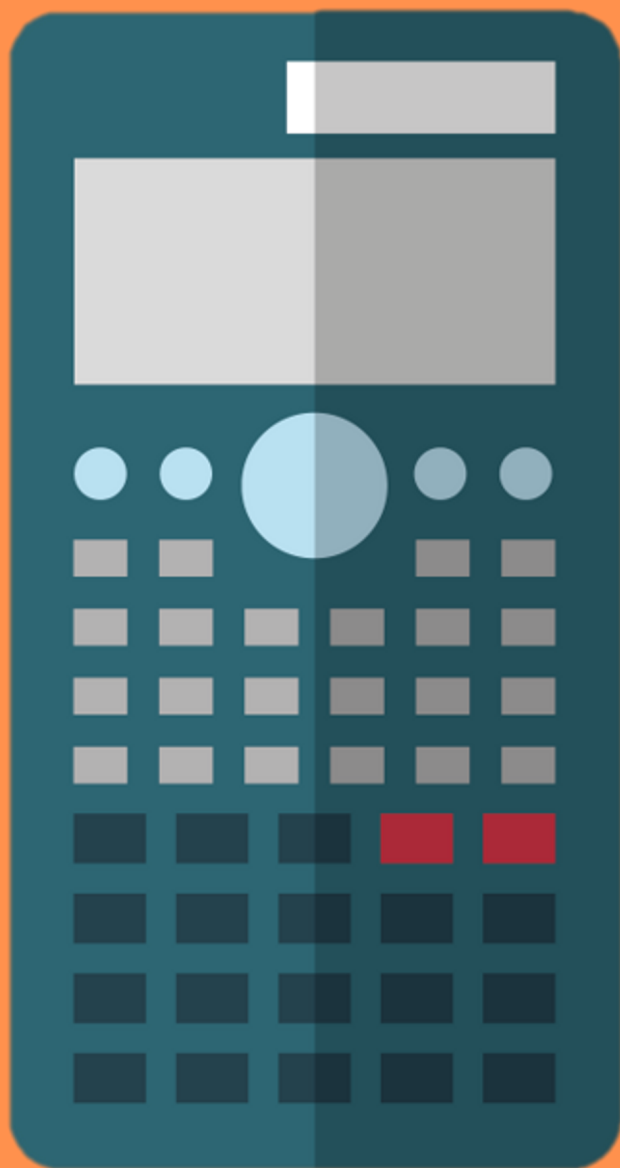# A / A* questions

2013

0580/21
MAY/JUNE
YEAR
2013

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1 One January day in Munich, the temperature at noon was 3°C.
At midnight the temperature was –8°C.

Write down the difference between these two temperatures.

Answer .... °C [1]

2 **(a)** Calculate $\sqrt{5.7} - 1.03^2$.

Write down all the numbers displayed on your calculator.

Answer(a) .... [1]

(b) Write your answer to **part (a)** correct to 3 decimal places.

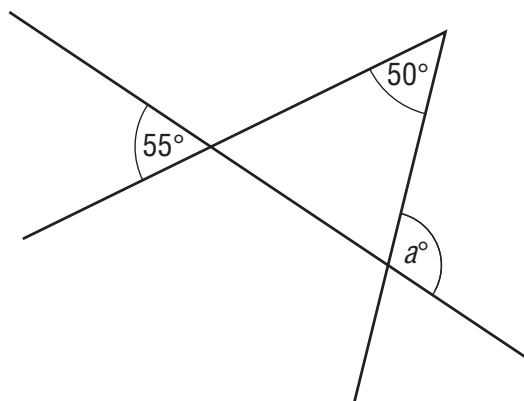*Answer(b)* .... [1]

3 Pedro and Eva do their homework.
Pedro takes 84 minutes to do his homework.

The ratio   Pedro's time : Eva's time = 7 : 6.

Work out the number of minutes Eva takes to do her homework.

Answer .... min [2]

4

NOT TO
SCALE

50°

55°

$a°$

Use the information in the diagram to find the value of *a*.

Answer a = ... [2]

15 A sphere has a volume of $80\,\text{cm}^3$.

Calculate the radius of the sphere.
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

Answer .... cm [3]

---

16 A water pipe has a circular cross section of radius $0.75\,\text{cm}$.
Water flows through the pipe at a rate of $16\,\text{cm/s}$.

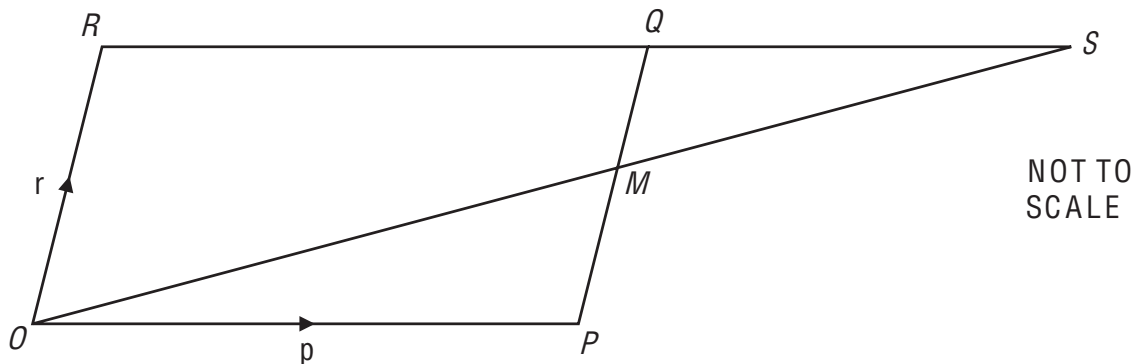Calculate the time taken for 1 litre of water to flow through the pipe.

Answer .... s [3]

19 *t* varies inversely as the square root of *u*.
t = 3 when *u* = 4.

Find *t* when *u* = 49.

Answer t = ... [3]

_____

20

OPQR is a parallelogram, with *O* the origin.
M is the midpoint of *PQ*.
OM and *RQ* are extended to meet at *S*.
$\overrightarrow{OP}$ = **p** and $\overrightarrow{OR}$ = **r**.

(a) Find, in terms of **p** and **r**, in its simplest form,

    (i) $\overrightarrow{OM}$,

Answer(a)(i) $\overrightarrow{OM}$ = ... [1]

    (ii) the position vector of *S*.

Answer(a)(ii) .... [1]

(b) When $\overrightarrow{PT} = -\frac{1}{2}\mathbf{p} + \mathbf{r}$, what can you write down about the position of *T*?

Answer(b) .... [1]
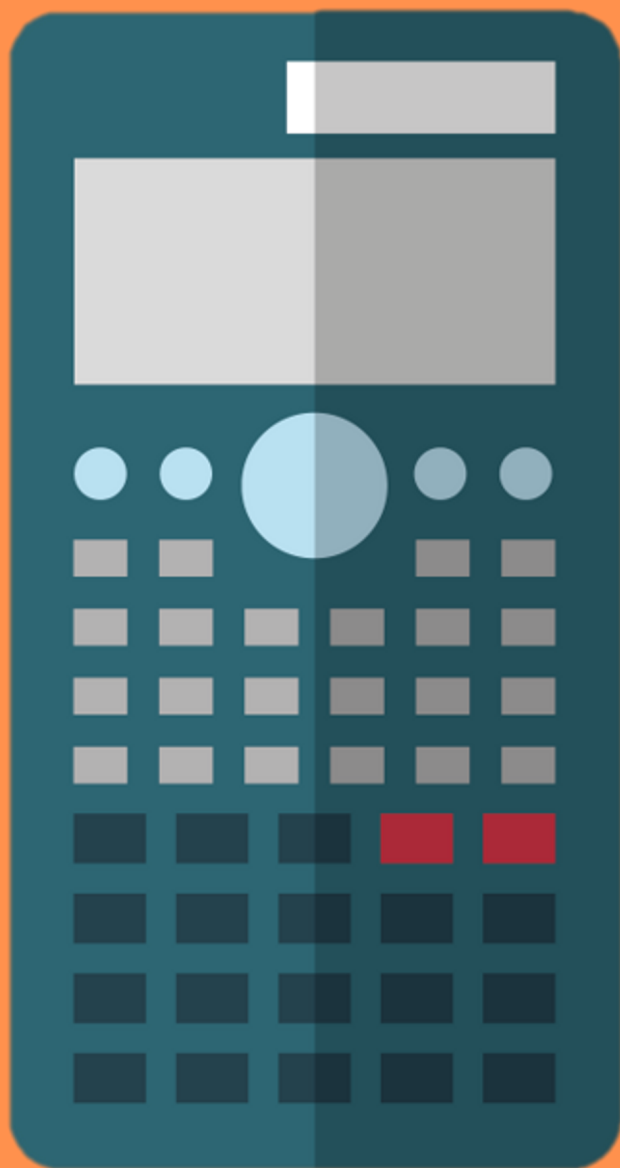
_____

0580/41
MAY/JUNE
YEAR
2013

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1 **(a)** One day, Maria took 27 minutes to walk 1.8 km to school.
She left home at 07 48.

    (i) Write down the time Maria arrived at school.

Answer(a)(i) .... [1]

    (ii) Show that Maria's average walking speed was 4 km/h.

Answer(a)(ii)

[2]

(b) Another day, Maria cycled the 1.8 km to school at an average speed of 15 km/h.

    (i) Calculate the percentage **increase** that 15 km/h is on Maria's walking speed of 4 km/h.

Answer(b)(i) .... % [3]

    (ii) Calculate the percentage **decrease** that Maria's cycling time is on her walking time of 27 minutes.
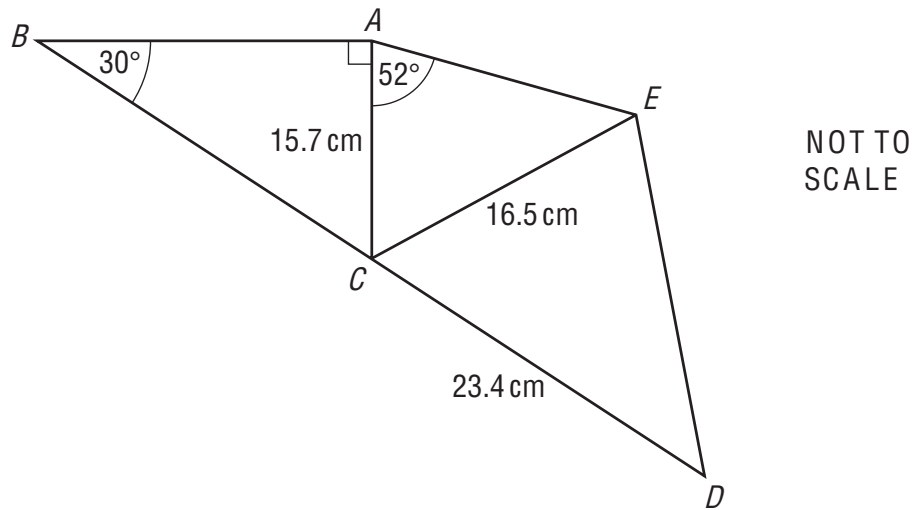
Answer(b)(ii) .... % [3]

(iii) After school, Maria cycled to her friend's home.
This took 9 minutes, which was 36% of the time Maria takes to walk to her friend's home.

Calculate the time Maria takes to walk to her friend's home.

Answer(b)(iii) .... min [2]

6

In the diagram, *BCD* is a straight line and *ABDE* is a quadrilateral.
Angle *BAC* = 90°, angle *ABC* = 30° and angle *CAE* = 52°.
AC = 15.7 cm, *CE* = 16.5 cm and *CD* = 23.4 cm.

(a) Calculate *BC*.

Answer(a) BC = ... cm [3]

(b) Use the sine rule to calculate angle *AEC*.
Show that it rounds to 48.57°, correct to 2 decimal places.

Answer(b)

[3]

(c) (i) Show that angle $ECD = 40.6°$, correct to 1 decimal place.
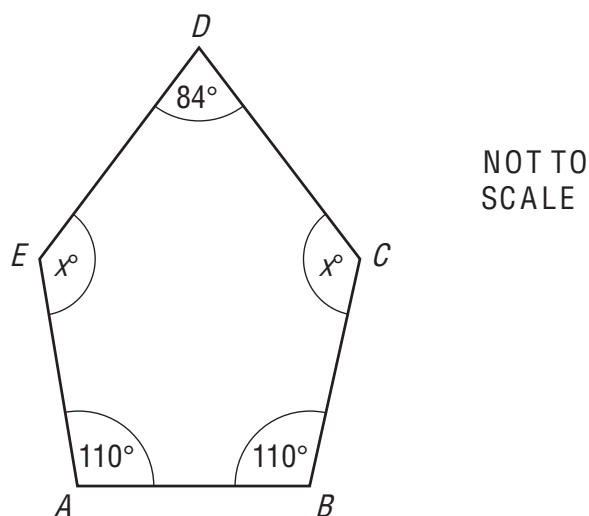
Answer(c)(i)

[2]

(ii) Calculate *DE*.

Answer(c)(ii) *DE* = ... cm [4]

(d) Calculate the area of the quadrilateral *ABDE*.

Answer(d) .... cm² [4]

 [Turn over

8 **(a)**

NOT TO
SCALE

In the pentagon *ABCDE*, angle *EAB* = angle *ABC* = 110° and angle *CDE* = 84°.
Angle *BCD* = angle *DEA* = *x*°.

(i) Calculate the value of *x*.

Answer(a)(i) *x* = ... [2]

(ii) *BC* = *CD*.
Calculate angle *CBD*.

Answer(a)(ii) Angle *CBD* = ... [1]

(iii) This pentagon also has one line of symmetry.
Calculate angle *ADB*.

Answer(a)(iii) Angle *ADB* = ... [1]

(b) *A*, *B* and *C* lie on a circle centre *O*.
Angle *AOC* = 3*y*° and angle *ABC* = (4*y* + 4)°.

Find the value of *y*.

NOT TO
SCALE

Answer(b) *y* = ... [4]

(c)

NOT TO
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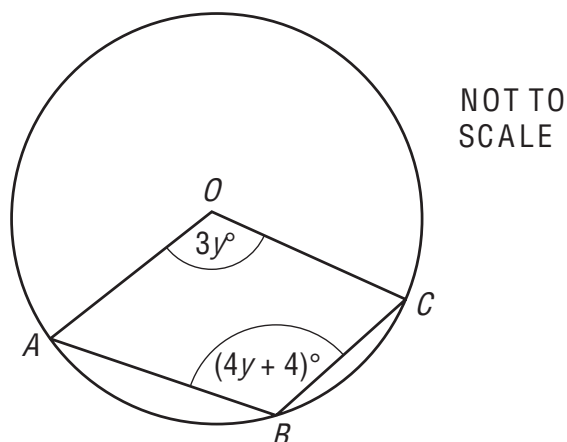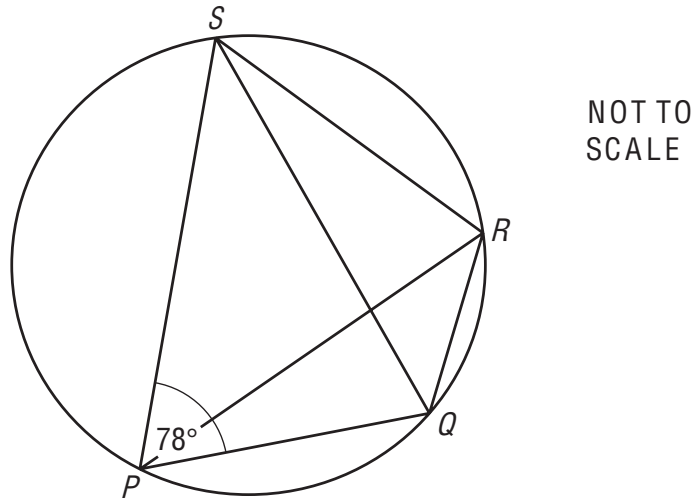
In the cyclic quadrilateral *PQRS*, angle *SPQ* = 78°.

(i) Write down the geometrical reason why angle *QRS* = 102°.

Answer(c)(i) .... [1]

(ii) Angle *PRQ* : Angle *PRS* = 1 : 2.

Calculate angle *PQS*.

Answer(c)(ii) Angle *PQS* = ... [3]

(d)

NOT TO
SCALE
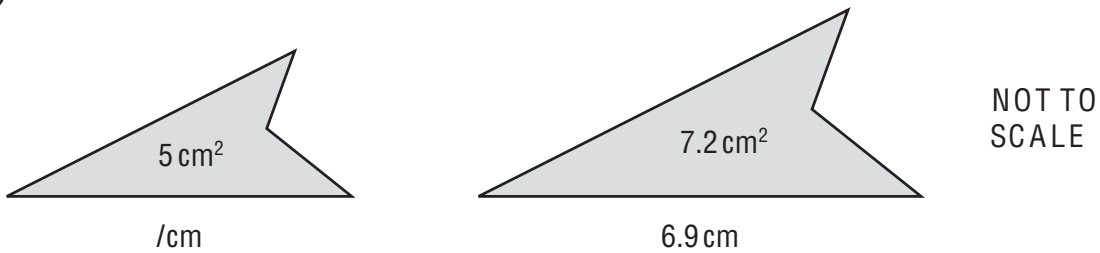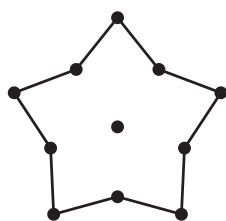
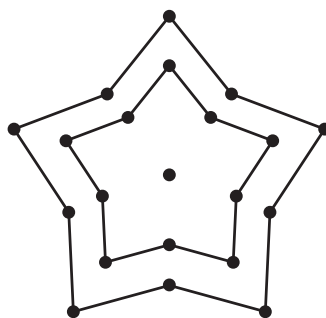The diagram shows two similar figures.
The areas of the figures are 5 cm² and 7.2 cm².
The lengths of the bases are *l* cm and 6.9 cm.

Calculate the value of *l*.

Answer(d) l = ... [3]
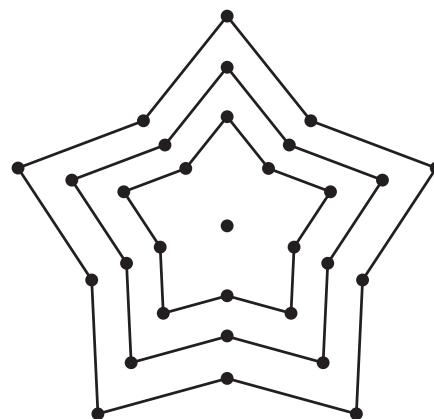
10

Star 1   Star 2   Star 3

The diagrams show a sequence of stars made of lines and dots.

(a) Complete the table for Star 5, Star 7 and Star *n*.

	Star 1	Star 2	Star 3	Star 4	Star 5		Star 7		Star *n*
Number of lines	10	20	30	40					
Number of dots	11	21	31	41					

[4]

(b) The sums of the number of dots in two consecutive stars are shown in the table.

Star 1 and Star 2	Star 2 and Star 3	Star 3 and Star 4
32	52	72

Find the sum of the number of dots in

(i) Star 10 and Star 11,

Answer(b)(i) .... [1]

(ii) Star *n* and Star (*n* + 1),

Answer(b)(ii) .... [1]

(iii) Star (*n* + 7) and Star (*n* + 8).

Answer(b)(iii) .... [1]

(c) The **total number of dots** in the first n stars is given by the expression $5n^2 + 6n$.

    (i) Show that this expression is correct when $n = 3$.

    Answer(c)(i)

[2]

    (ii) Find the total number of dots in the first 10 stars.

                                   Answer(c)(ii) .... [1]

(d) The total number of dots in the first n stars is $5n^2 + 6n$.
The number of dots in the $(n + 1)$th star is $10(n + 1) + 1$.

Add these two expressions to show that the total number of dots in the first $(n + 1)$ stars is

$$5(n + 1)^2 + 6(n + 1).$$

You must show each step of your working.
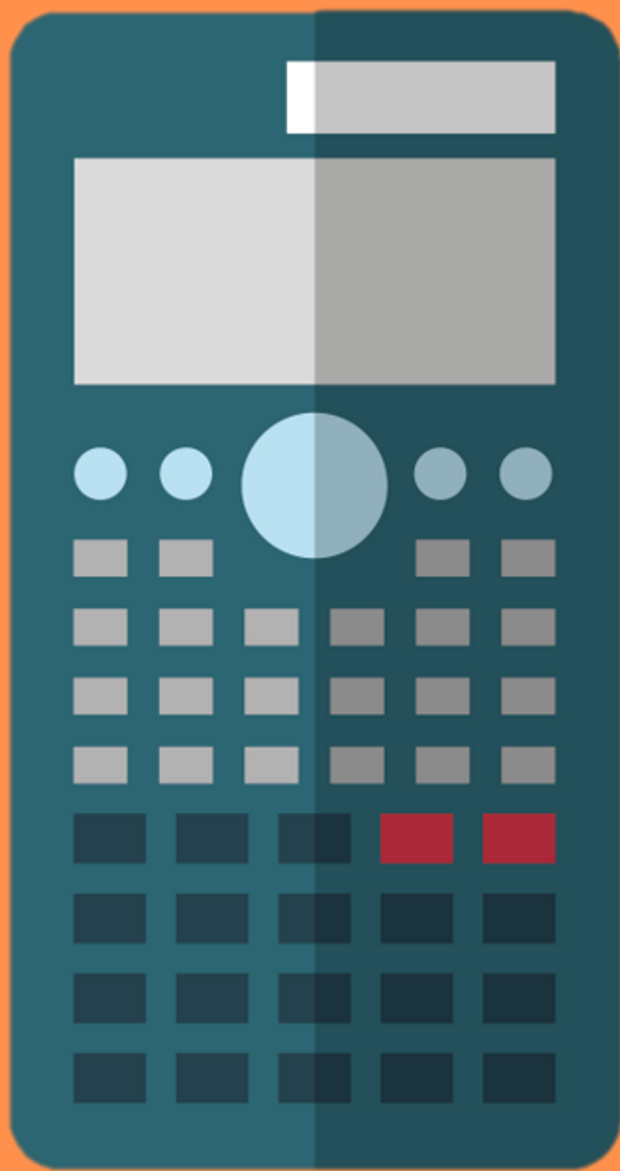
Answer(d)

[4]
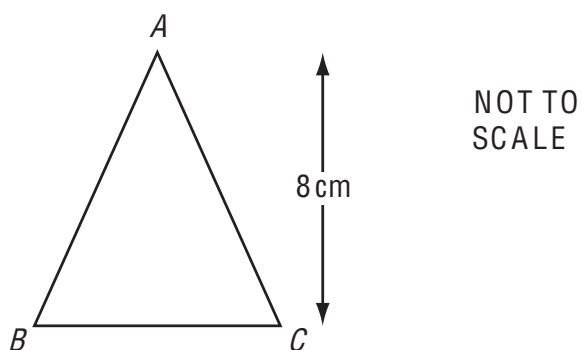
0580/22
MAY/JUNE
YEAR
2013

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4 Calculate $(4.3 \times 10^8) + (2.5 \times 10^7)$.

Give your answer in standard form.

Answer .... [2]

5

Triangle *ABC* has a height of 8 cm and an area of 42 cm².

Calculate the length of *BC*.

Answer BC = ... cm [2]

6 George and his friend Jane buy copies of the same book on the internet.
George pays $16.95 and Jane pays £11.99 on a day when the exchange rate is $1 = £0.626.

Calculate, in dollars, how much more Jane pays.

Answer $ .... [2]

7 **(a)** Use your calculator to work out $\sqrt{65} - 1.7^2$.

Write down all the numbers displayed on your calculator.

Answer(a) .... [1]

(b) Write your answer to **part (a)** correct to 2 significant figures.

Answer(b) .... [1]

8 Joe measures the side of a square correct to 1 decimal place.
He calculates the **upper** bound for the area of the square as $37.8225 \, \text{cm}^2$.

Work out Joe's measurement for the side of the square.

Answer .... cm [2]

17 The owner of a small café records the average air temperature and the number of hot drinks he sells each day for a week.

Air temperature (°C)	18	23	19	23	24	25	20
Number of hot drinks sold	12	8	13	10	9	7	12

(a) On the grid, draw a scatter diagram to show this information.
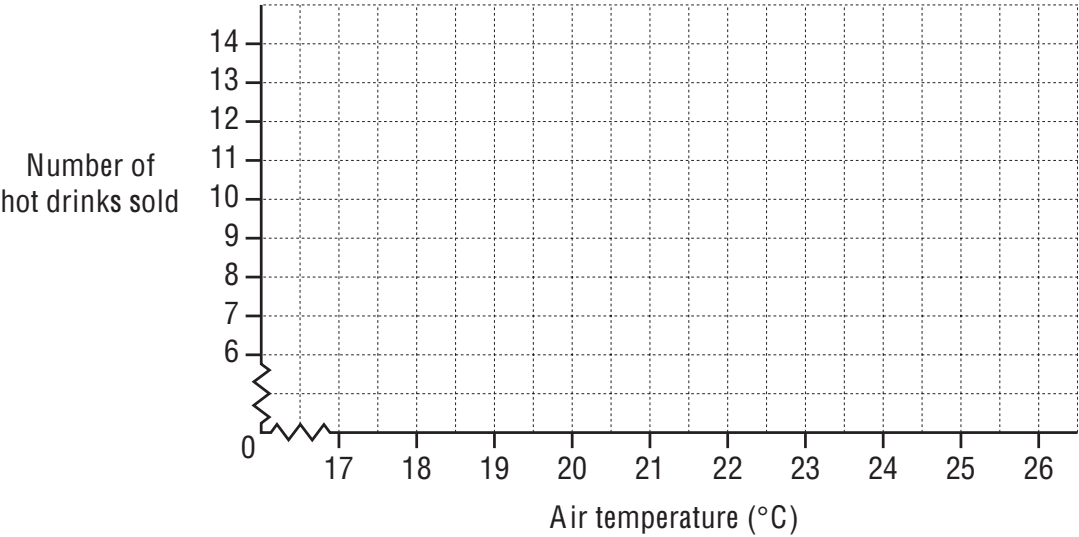
[2]

(b) What type of correlation does your scatter diagram show?

Answer(b) .... [1]

(c) Draw a line of best fit on the grid. [1]

18 Solve $6x + 3 < x < 3x + 9$ for **integer** values of x.

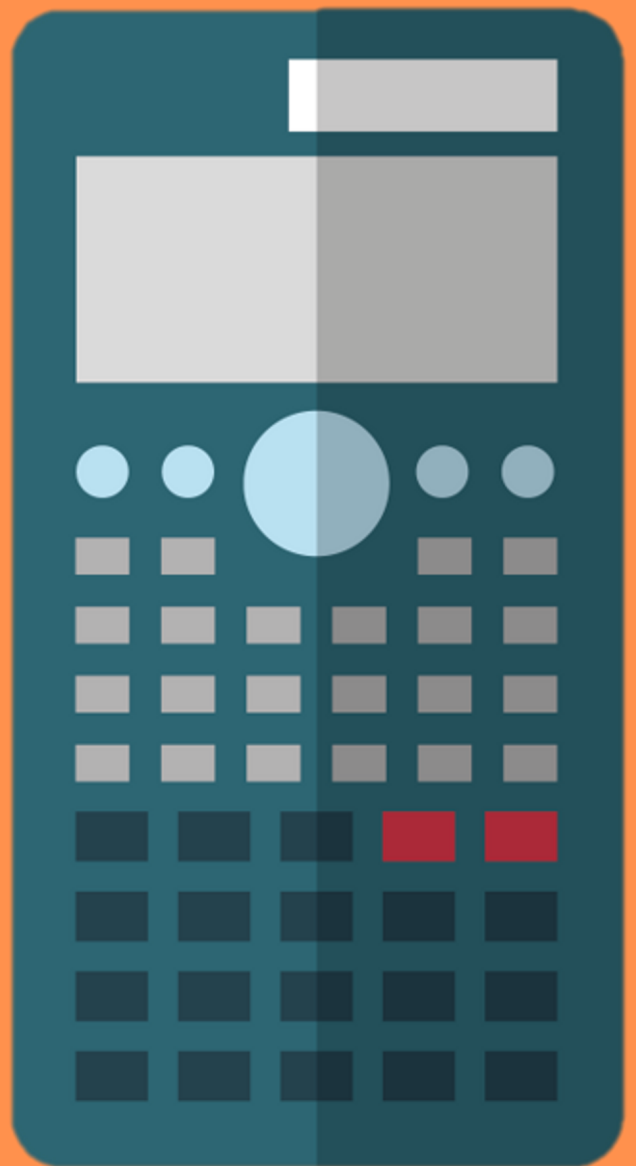*Answer* .... [4]

0580/42

MAY/JUNE

YEAR

2013

5   Paul buys a number of large sacks of fertiliser costing $x each.

He spends $27.

(a) Write down, in terms of x, an expression for the number of large sacks which Paul buys.

Answer(a) .... [1]

(b) Rula buys a number of small sacks of fertiliser.
Each small sack costs $2 less than a large sack.
Rula spends $25.

Write down, in terms of x, an expression for the number of small sacks which Rula buys.

Answer(b) .... [1]

(c) Rula buys 4 more sacks than Paul.
Write down an equation in x and show that it simplifies to $2x^2 - 3x - 27 = 0$.

Answer(c)

[4]

(d) Solve $2x^2 - 3x - 27 = 0$.

Answer(d) x = ... or *x =* .... [3]

(e) Calculate the number of sacks which Paul buys.

Answer(e) .... [1]

7 $\mathbf{A} = \begin{pmatrix} 5 \\ 7 \end{pmatrix}$ $\mathbf{B} = (6 \quad -4)$ $\mathbf{C} = \begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}$ $\mathbf{D} = \begin{pmatrix} 2 & 9 \\ -1 & -3 \end{pmatrix}$

(a) Calculate the result of each of the following, if possible.

If a calculation is not possible, write "not possible" in the answer space.

(i) 3**A**

Answer(a)(i) [1]

(ii) **AC**

Answer(a)(ii) [1]

(iii) **BA**

Answer(a)(iii) [2]

(iv) **C** + **D**

Answer(a)(iv) [1]

(v) **D**^{2}

Answer(a)(v) [2]

(b) Calculate **C**$^{-1}$, the inverse of **C**.

Answer(b) [2]

9 (a)

NOT TO
SCALE

12 cm

4 cm
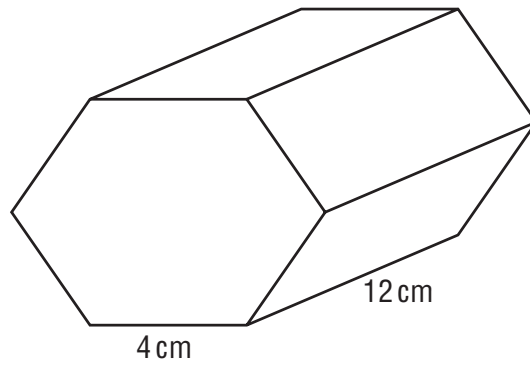
The diagram shows a prism of length 12 cm.
The cross section is a regular hexagon of side 4 cm.

Calculate the total surface area of the prism.

Answer(a) .... cm² [4]

(b) Water flows through a cylindrical pipe of radius 0.74 cm.
It fills a 12 litre bucket in 4 minutes.

(i) Calculate the speed of the water through the pipe in centimetres per minute.

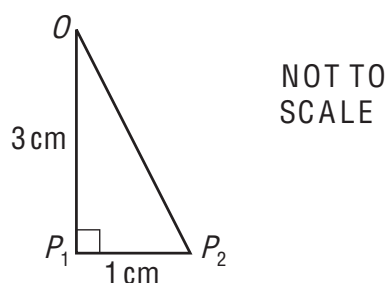*Answer(b)*(i) .... cm/min [4]

(ii) When the 12 litre bucket is emptied into a circular pool, the water level rises by 5 **millimetres**.

Calculate the radius of the pool correct to the nearest centimetre.

Answer(b)(ii) .... cm [5]

11 Sidney draws the triangle OP_1P_2.
$OP_1 = 3$ cm and $P_1P_2 = 1$ cm.
Angle $OP_1P_2 = 90°$.

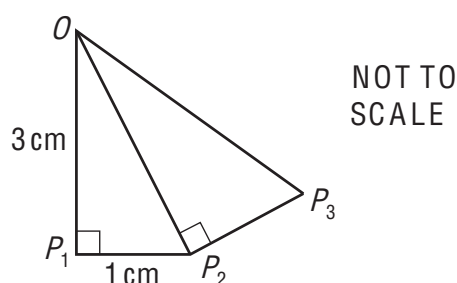NOT TO
SCALE

3 cm

P_1 $\quad$ P_2

1 cm

(a) Show that $OP_2 = \sqrt{10}$ cm.

Answer(a)

[1]

(b) Sidney now draws the lines P_2P_3 and OP_3.
Triangle OP_2P_3 is mathematically similar
to triangle OP_1P_2.

NOT TO
SCALE

3 cm

P_1 $\quad$ P_3

1 cm $\quad$ P_2

(i) Write down the length of P_2P_3 in the form $\dfrac{\sqrt{a}}{b}$ where a and b are integers.

Answer(b)(i) $P_2P_3 =$ .... cm [1]

(ii) Calculate the length of OP_3 giving your answer in the form $\dfrac{c}{d}$ where c and d are integers.

Answer(b)(ii) $OP_3 =$ .... cm [2]

(c) Sidney continues to add
mathematically similar triangles
to his drawing.

Find the length of OP_5.

P_5

O

P_4 $\quad$ NOT TO
SCALE

3 cm

P_3

P_1

1 cm $\quad$ P_2
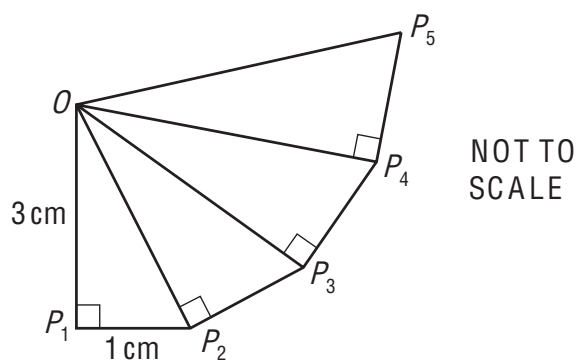
Answer(c) $OP_5 =$ .... cm [2]

(d) (i) Show that angle $P_1OP_2 = 18.4°$, correct to 1 decimal place.

Answer(d)(i)

[2]

(ii) Write down the size of angle P_2OP_3.

Answer(d)(ii) Angle $P_2OP_3 =$ .... [1]

(iii) The last triangle Sidney can draw without covering his first triangle is triangle $OP_{(n-1)}P_n$.
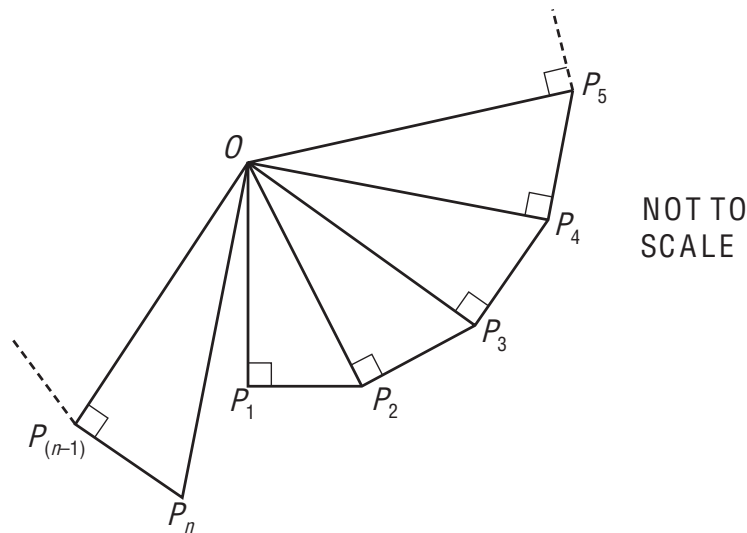
Calculate the value of *n*.

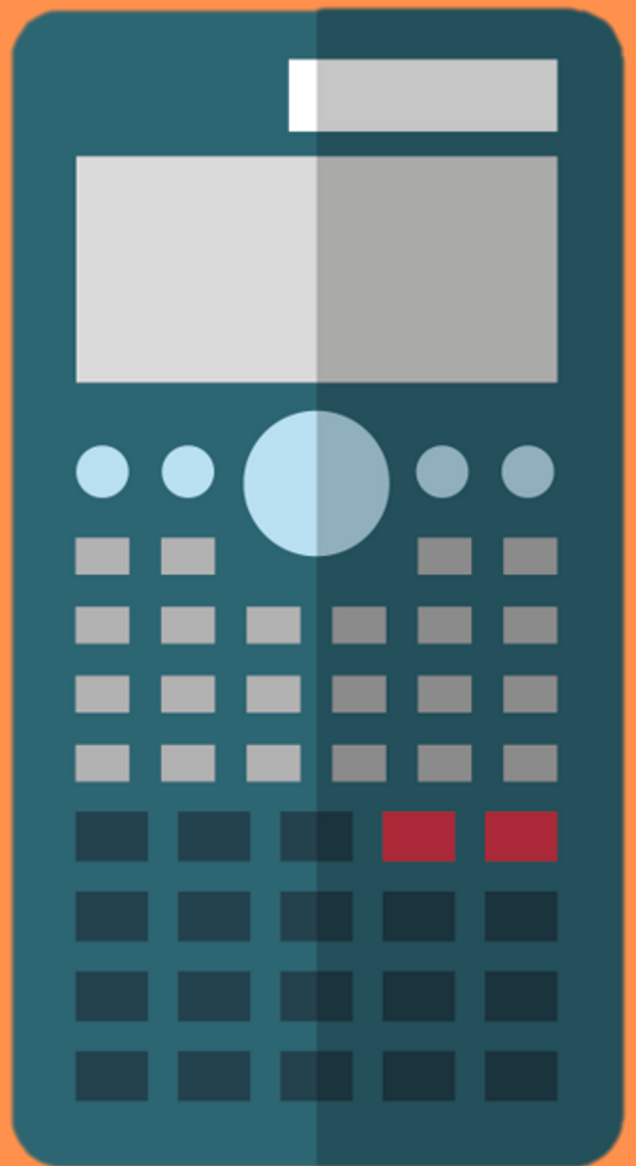*Answer(d)*(iii) *n* = ... [3]

0580/23
MAY/JUNE
YEAR 2013

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11 The sum of the prime numbers less than 8 is equal to 17.
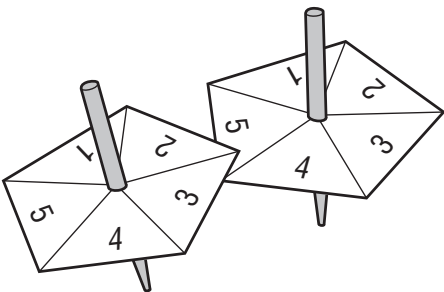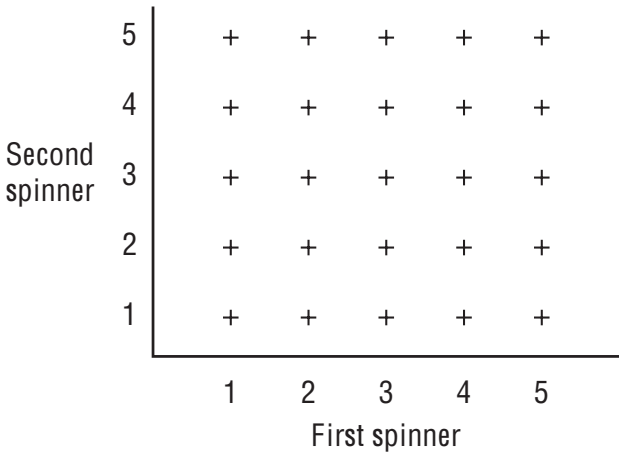
(a) Find the sum of the prime numbers less than 21.

Answer(a) .... [2]

(b) The sum of the prime numbers less than x is 58.

Find an integer value for x.

Answer(b) x = ... [2]

_____

12 Two spinners have sections numbered from 1 to 5.
Each is spun once and each number is equally likely.
The possibility diagram is shown below.
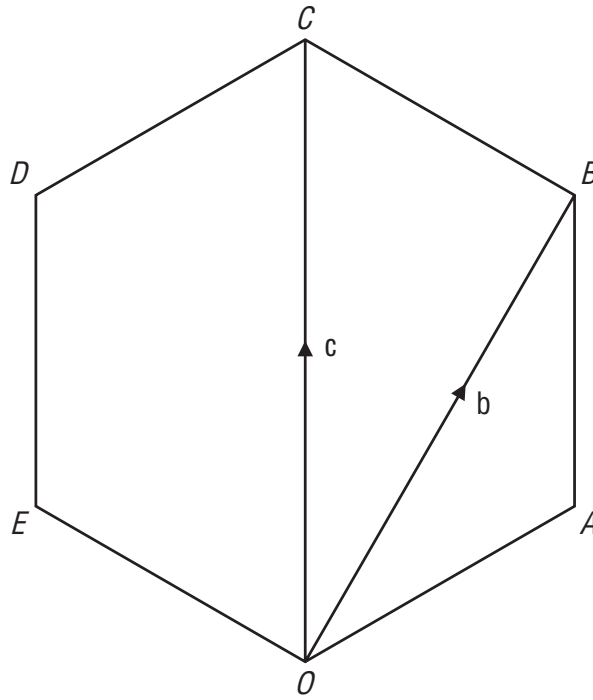

Find the probability that

(a) both spinners show the same number,

Answer(a) .... [2]

(b) the sum of the numbers shown on the two spinners is 7.

Answer(b) .... [2]

_____

19

OABCDE is a regular polygon.

(a) Write down the geometrical name for this polygon.

Answer(a) .... [1]

(b) *O* is the origin. $\overrightarrow{OB} = \mathbf{b}$ and $\overrightarrow{OC} = \mathbf{c}$.

Find, in terms of **b** and **c**, in their simplest form,

(i) $\overrightarrow{BC}$,

Answer(b)(i) $\overrightarrow{BC}$ = ... [1]

(ii) $\overrightarrow{OA}$,

Answer(b)(ii) $\overrightarrow{OA}$ = ... [2]

(iii) the position vector of *E*.

Answer(b)(iii) .... [1]

Question 20 is printed on the next page.

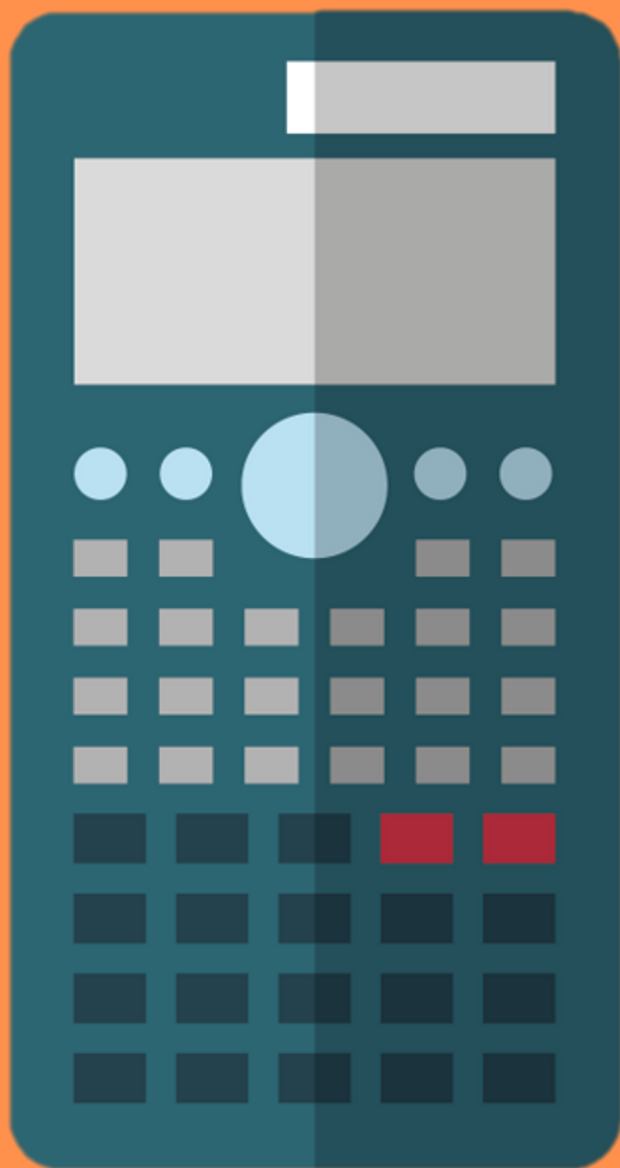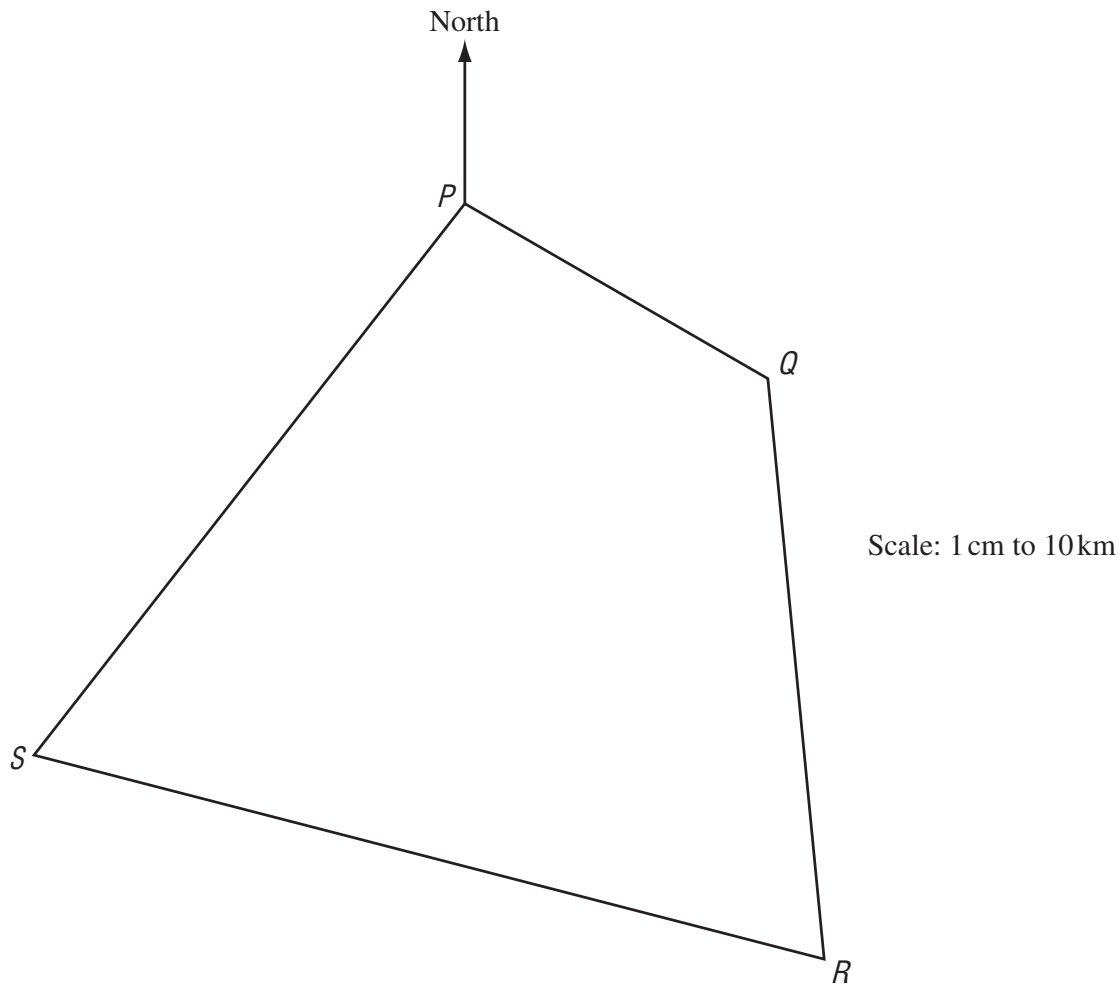   **[Turn over**

0580/43
MAY/JUNE
YEAR
2013

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2 **(a)** **In this question show all your construction arcs and use only a ruler and compasses to draw the boundaries of your region.**

This scale drawing shows the positions of four towns, *P*, *Q*, *R* and *S*, on a map where 1 cm represents 10 km.

Scale: 1 cm to 10 km

A nature reserve lies in the quadrilateral *PQRS*.
The boundaries of the nature reserve are:

- equidistant from *Q* and from *R*
- equidistant from *PS* and from *PQ*
- 60 km from *R*
- along *QR*.

(i) Shade the region which represents the nature reserve. [7]
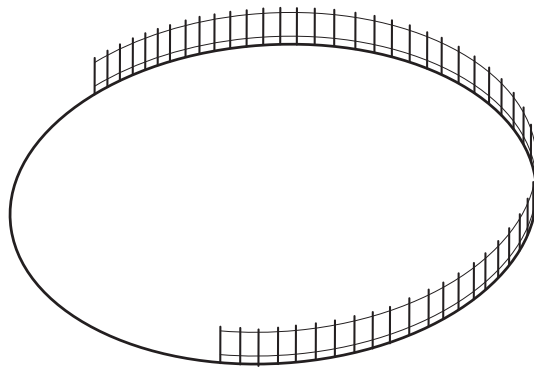
(ii) Measure the bearing of *S* from *P*.

Answer(a)(ii) .... [1]

(b) A circular lake in the nature reserve has a radius of 45 m.

    (i) Calculate the area of the lake.

Answer(b)(i) .... m^2 [2]

(ii)

NOT TO
SCALE

A fence is placed along part of the circumference of the lake.
This arc subtends an angle of 210° at the centre of the circle.

Calculate the length of the fence.

Answer(b)(ii) .... m [2]

3 **(a)** Luk wants to buy *x* goats and *y* sheep.

    (i) He wants to buy at least 5 goats.

    Write down an inequality in *x* to represent this condition.

Answer(a)(i) .... [1]

    (ii) He wants to buy at least 11 sheep.

    Write down an inequality in *y* to represent this condition.

Answer(a)(ii) .... [1]

    (iii) He wants to buy at least 20 animals.

    Write down an inequality in *x* and *y* to represent this condition.

Answer(a)(iii) .... [1]

(b) Goats cost $4 and sheep cost $8.
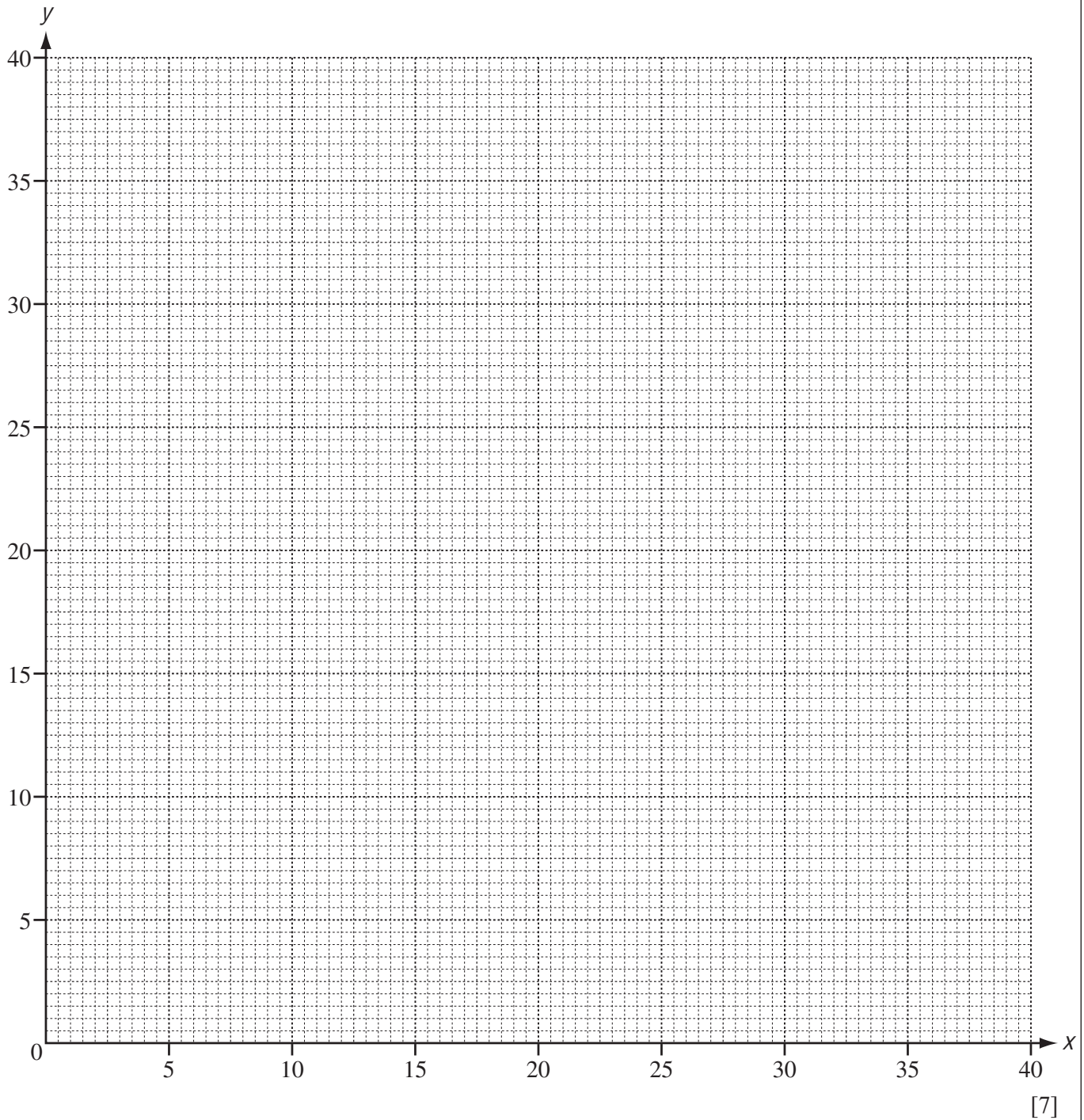The maximum Luk can spend is $160.

Write down an inequality in *x* and *y* and show that it simplifies to $x + 2y \leqslant 40$.

Answer(b)

[1]

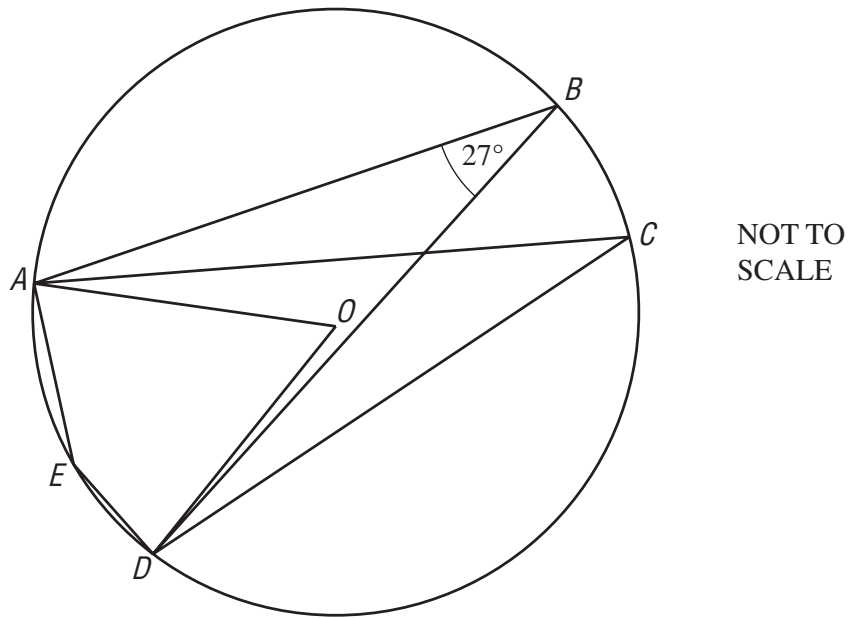**(c) (i)** On the grid below, draw four lines to show the four inequalities and shade the **unwanted** regions.

[7]

(ii) Work out the maximum number of animals that Luk can buy.

Answer(c)(ii) .... [2]

8 **(a)**

NOT TO
SCALE

A, *B*, *C*, *D* and *E* are points on the circle centre *O*.
Angle *ABD* = 27°.

Find

(i) angle *ACD*,

Answer(a)(i) Angle *ACD* = ... [1]

(ii) angle *AOD*,

Answer(a)(ii) Angle *AOD* = ... [1]

(iii) angle *AED*.

Answer(a)(iii) Angle *AED* = ... [1]

(b)

NOT TO
SCALE
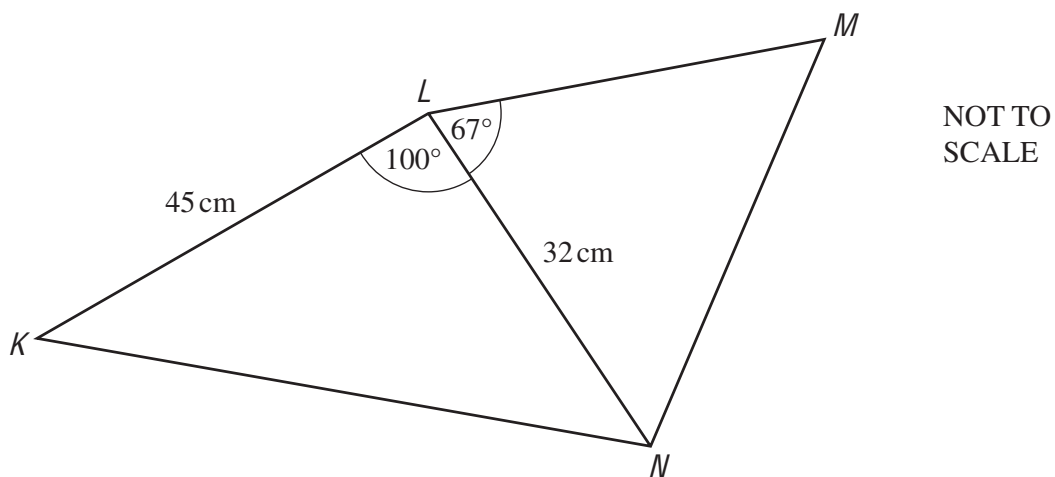
The diagram shows quadrilateral *KLMN*.
KL = 45 cm, *LN* = 32 cm, angle *KLN* = 100° and angle *NLM* = 67°.
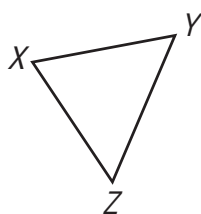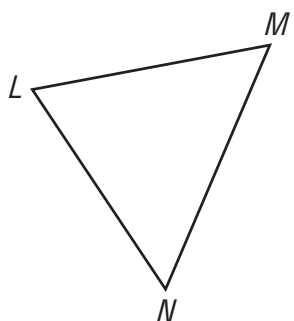
(i) Calculate the length *KN*.

Answer(b)(i) *KN* = ... cm [4]

(ii) The area of triangle *LMN* is $324\,cm^2$.

Calculate the length *LM*.

Answer(b)(ii) *LM* = ... cm [3]

(iii) Another triangle *XYZ* is mathematically similar to triangle *LMN*.

NOT TO SCALE

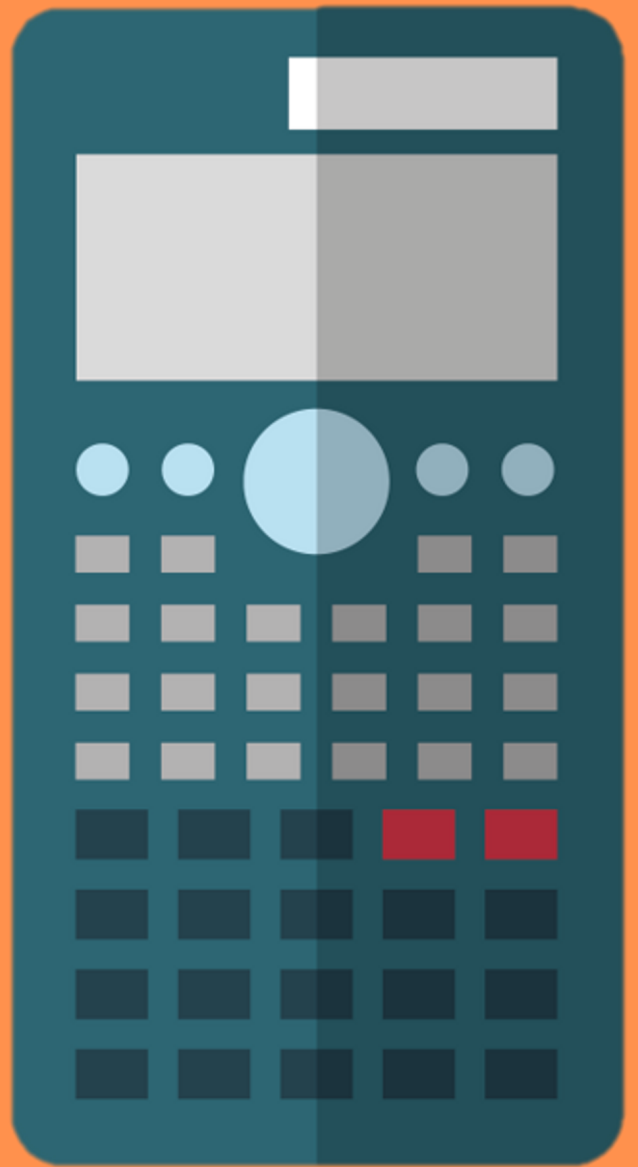*XZ* = 16 cm and the area of triangle *LMN* is $324\,cm^2$.

Calculate the area of triangle *XYZ*.

Answer(b)(iii) .... cm^2 [2]

0580/21

OCT/NOV

YEAR

2013

16
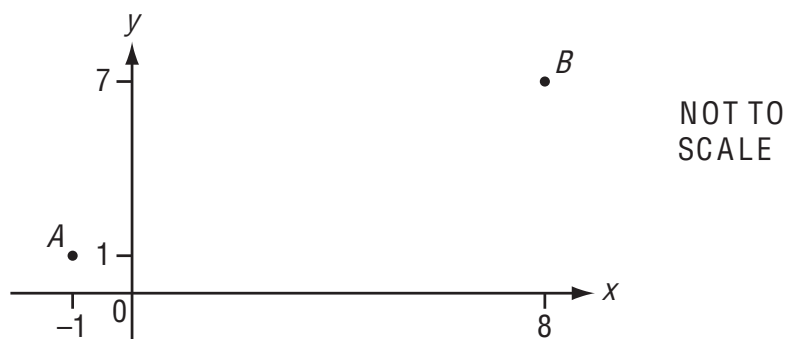
A is the point (–1, 1) and *B* is the point (8, 7).

(a) Write $\overrightarrow{AB}$ as a column vector.

Answer(a) $\overrightarrow{AB}$ = $\begin{pmatrix} & \\ & \end{pmatrix}$ [1]

(b) Find $|\overrightarrow{AB}|$.

Answer(b) $|\overrightarrow{AB}|$ = ... [2]

(c) $\overrightarrow{AC} = 2\overrightarrow{AB}$.

Write down the co-ordinates of *C*.

Answer(c) (................ , ...) [1]

___

17 Factorise completely.

(a) $a + b + at + bt$

Answer(a) .... [2]

(b) $x^2 - 2x - 24$

Answer(b) .... [2]

18 The diagram shows a solid hemisphere.
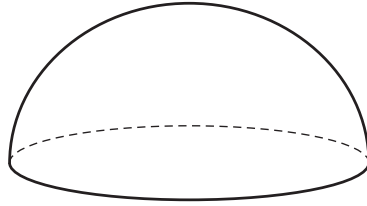
The **total** surface area of this hemisphere is $243\,\pi$.
The volume of the hemisphere is $k\,\pi$.

Find the value of k.

[The surface area, A, of a sphere with radius r is $A = 4\,\pi r^2$.]
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

Answer k = ... [4]

_____

19 (a) Convert $144\,\text{km/h}$ into metres per second.

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

(b) A train of length $120\,\text{m}$ is travelling at $144\,\text{km/h}$.
It passes under a bridge of width $20\,\text{m}$.

Find the time taken for the whole train to pass under the bridge.
Give your answer in seconds.

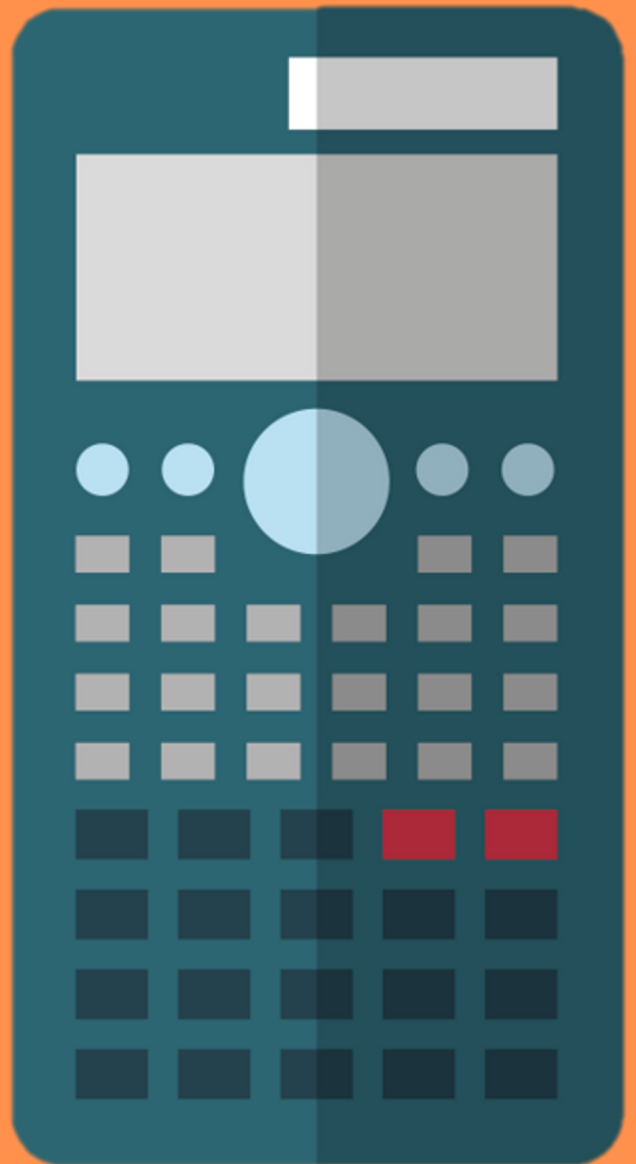*Answer(b)* .... s [2]
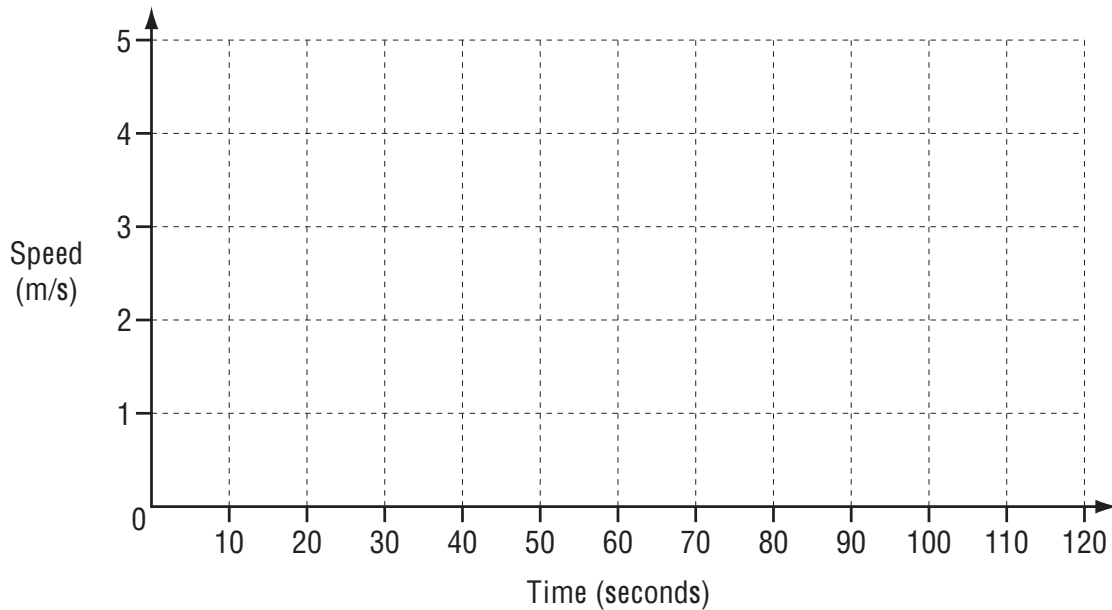
_____

0580/41

OCT/NOV

YEAR

2013

2 Emily cycles along a path for 2 minutes.
She starts from rest and accelerates at a constant rate until she reaches a speed of 5 m/s after 40 seconds.
She continues cycling at 5 m/s for 60 seconds.
She then decelerates at a constant rate until she stops after a further 20 seconds.

(a) On the grid, draw a speed-time graph to show Emily's journey.
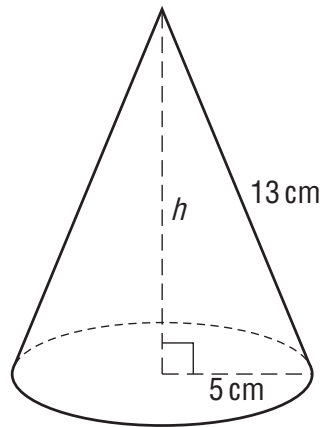

[2]

(b) Find Emily's acceleration.

Answer(b) .... m/s^2 [1]

(c) Calculate Emily's average speed for the journey.

Answer(c) .... m/s [4]

3

NOT TO SCALE

13 cm

h

5 cm

(a) The diagram shows a cone of radius 5 cm and slant height 13 cm.

(i) Calculate the curved surface area of the cone.
[The curved surface area, *A*, of a cone with radius *r* and slant height *l* is $A = \pi r l$.]

Answer(a)(i) .... cm² [2]

(ii) Calculate the perpendicular height, *h*, of the cone.

Answer(a)(ii) *h* = ... cm [3]

(iii) Calculate the volume of the cone.
[The volume, *V*, of a cone with radius *r* and height *h* is $V = \frac{1}{3}\pi r^2 h$.]

Answer(a)(iii) .... cm³ [2]

(iv) Write your answer to **part (a)(iii)** in cubic metres.
Give your answer in standard form.

Answer(a)(iv) .... m³ [2]

(b)

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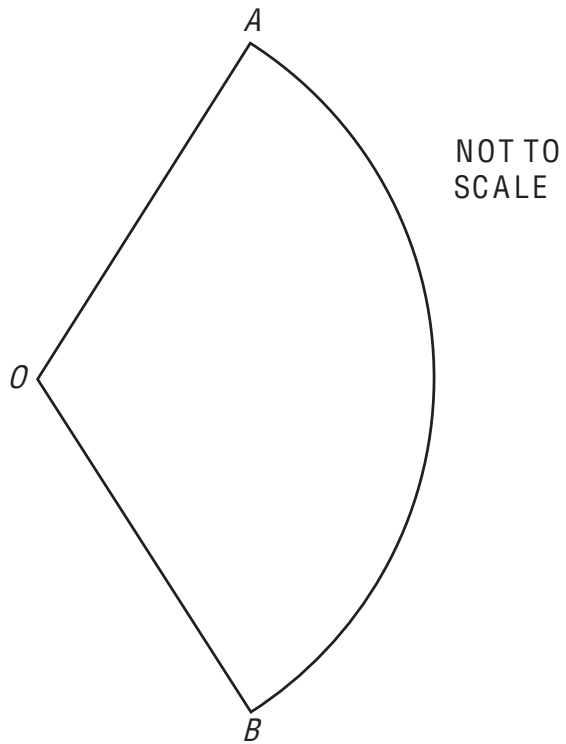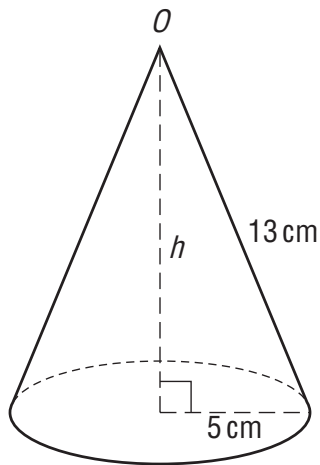
The cone is now cut along a slant height and it opens out to make the sector *AOB* of a circle.

Calculate angle *AOB*.

Answer(b) Angle *AOB* = ... [4]

6 **(a)**

The diagram shows the graph of $y = f(x)$ for $-3 \leqslant x \leqslant 3$.
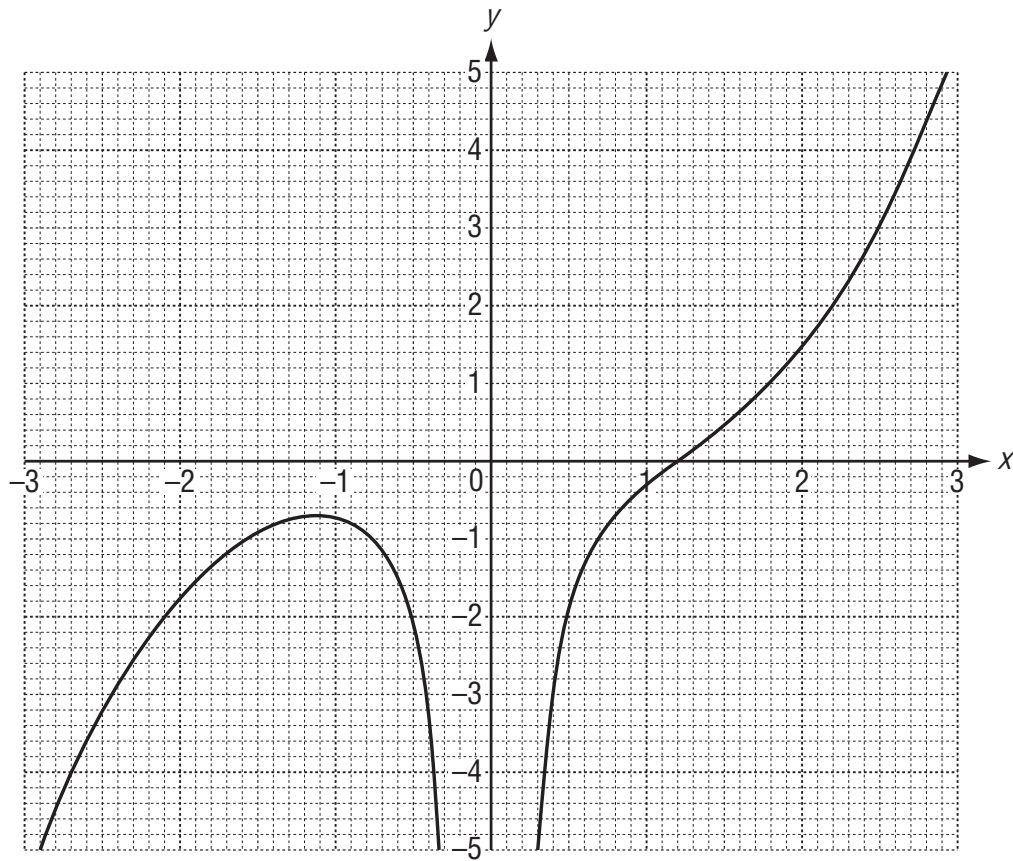
(i) Find f(2).

Answer(a)(i) .... [1]

(ii) Solve the equation $f(x) = 0$.

Answer(a)(ii) $x =$ .... [1]
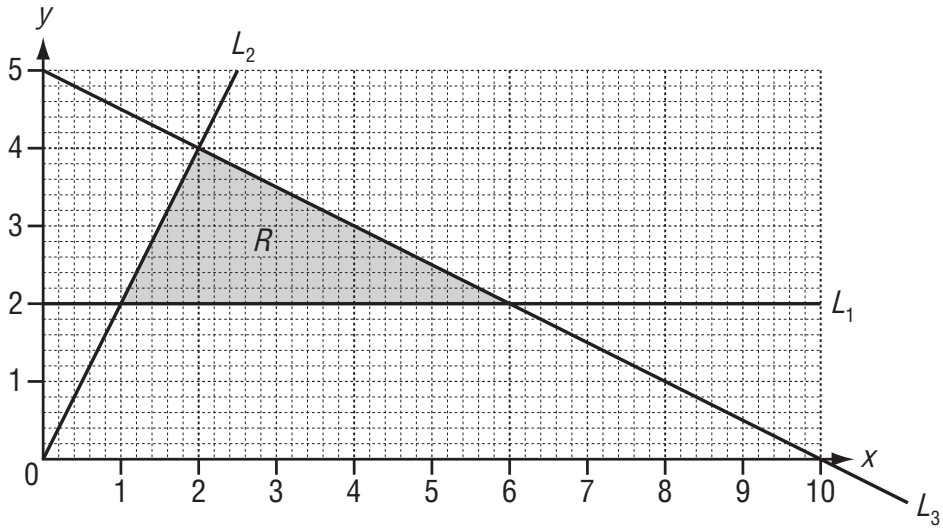
(iii) Write down the value of the largest **integer**, k, for which the equation $f(x) = k$ has 3 solutions.

Answer(a)(iii) $k =$ .... [1]

(iv) By drawing a suitable straight line, solve the equation $f(x) = x$.

Answer(a)(iv) $x =$ .... or $x =$ .... or $x =$ .... [3]

9

(a) Find the equations of the lines L_1, L_2 and L_3.

Answer(a) L_1 ....

L_2 ....

L_3 .... [5]

(b) Write down the three inequalities that define the shaded region, *R*.

Answer(b) ....

....

.... [3]

(c) A gardener buys *x* bushes and *y* trees.
The cost of a bush is $30 and the cost of a tree is $200.
The shaded region *R* shows the only possible numbers of bushes and trees the gardener can buy.

(i) Find the number of bushes and the number of trees when the total cost is $720.

Answer(c)(i) .... bushes

.... trees [2]

(ii) Find the number of bushes and the number of trees which give the greatest possible total cost.
Write down this greatest possible total cost.

Answer(c)(ii) .... bushes

.... trees

Greatest possible total cost = $ .... [3]

10 (a)

$$1 = 1$$

$$1 + 2 = 3$$

$$1 + 2 + 3 = 6$$

$$1 + 2 + 3 + 4 = 10$$

(i) Write down the next line of this pattern.

Answer(a)(i) .... [1]

(ii) The sum of the first *n* integers is $\dfrac{n}{k}(n + 1)$.

Show that *k* = 2.

Answer(a)(ii)

[2]

(iii) Find the sum of the first 60 integers.

Answer(a)(iii) .... [1]

(iv) Find *n* when the sum of the first *n* integers is 465.

Answer(a)(iv) *n* = ... [2]

(v) $1 + 2 + 3 + 4 + ... + x = \dfrac{(n-8)(n-7)}{2}$

Write *x* in terms of *n*.

Answer(a)(v) *x* = ... [1]

(b)

$$1^3 = 1$$

$$1^3 + 2^3 = 9$$

$$1^3 + 2^3 + 3^3 = 36$$

$$1^3 + 2^3 + 3^3 + 4^3 = 100$$

(i) Complete the statement.

$1^3 + 2^3 + 3^3 + 4^3 + 5^3 = $ .... $= ($......................$)^2$ [2]

(ii) The sum of the first n integers is $\dfrac{n}{2}(n+1)$.

Find an expression, in terms of n, for the sum of the first n cubes.

Answer(b)(ii) .... [1]

(iii) Find the sum of the first 19 cubes.

Answer(b)(iii) .... [2]

0580/22
OCT/NOV
YEAR
2013
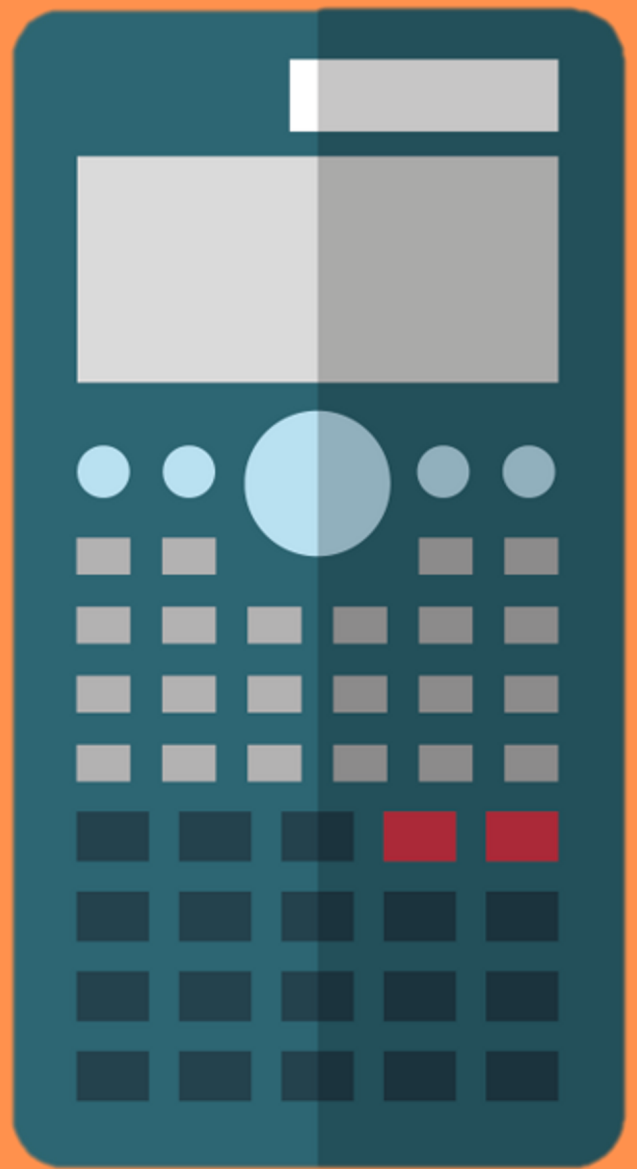
13 Pam wins the student of the year award in New Zealand.
She sends three photographs of the award ceremony by post to her relatives.

● one of size 13 cm by 23 cm to her uncle in Australia
● one of size 15 cm by 23 cm to her sister in China
● one of size 23 cm by 35 cm to her mother in the UK

Maximum lengths	Australia	Rest of the world
13 cm by 23.5 cm	$1.90	$2.50
15.5 cm by 23.5 cm	$2.40	$2.90
23 cm by 32.5 cm	$2.80	$3.40
26 cm by 38.5 cm	$3.60	$5.20

The cost of postage is shown in the table above.
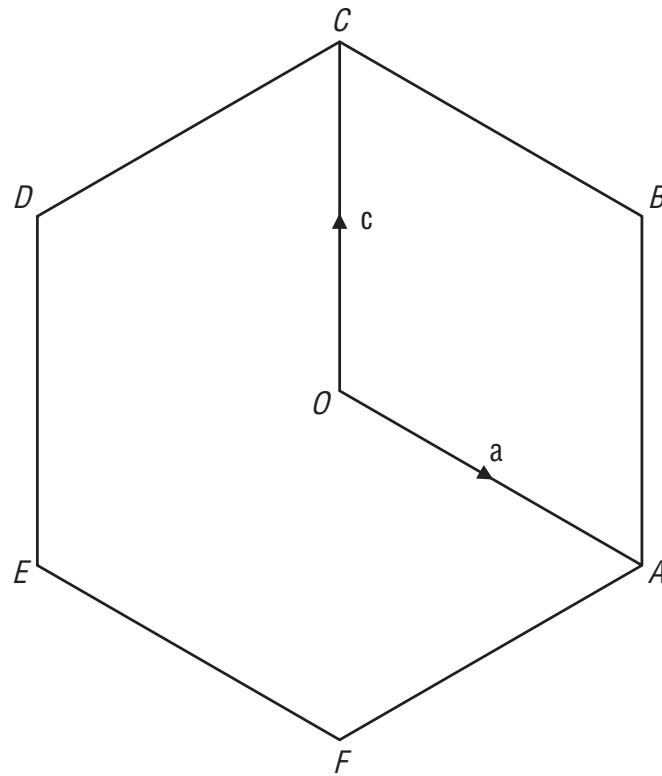Use this information to calculate the total cost.

Answer $ .... [3]

14
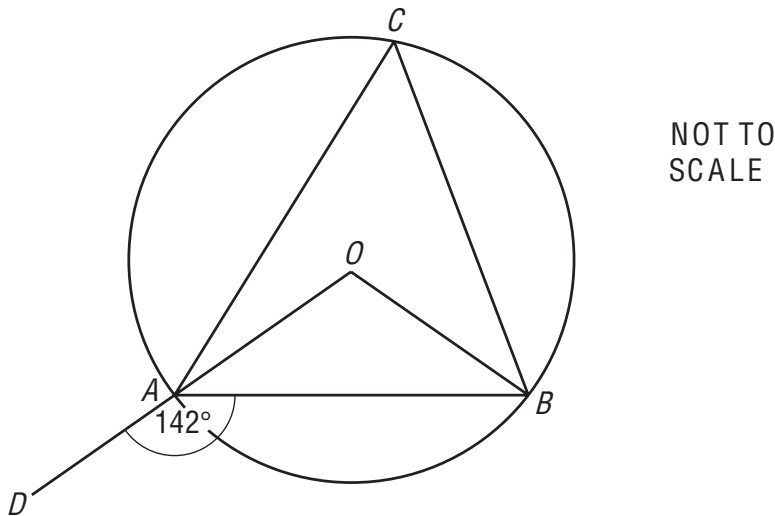
A, *B* and *C* are points on the circumference of a circle centre *O*.
OAD is a straight line and angle *DAB* = 142°.

Calculate the size of angle *ACB*.

Answer Angle *ACB* = ... [3]

19

O is the origin.
ABCDEF is a regular hexagon and *O* is the midpoint of *AD*.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$.

Find, in terms of **a** and **c**, in their simplest form

(a) $\overrightarrow{BE}$,

Answer(a) $\overrightarrow{BE}$ = ... [2]

(b) $\overrightarrow{DB}$,

Answer(b) $\overrightarrow{DB}$ = ... [2]

(c) the position vector of *E*.

Answer(c) .... [2]

0580/42

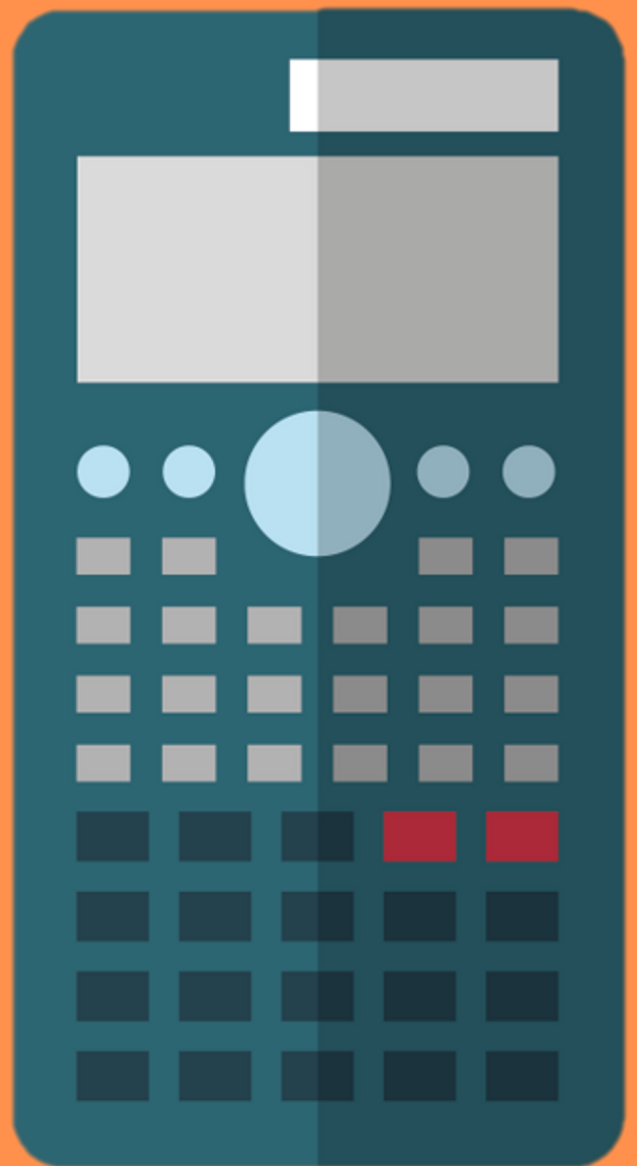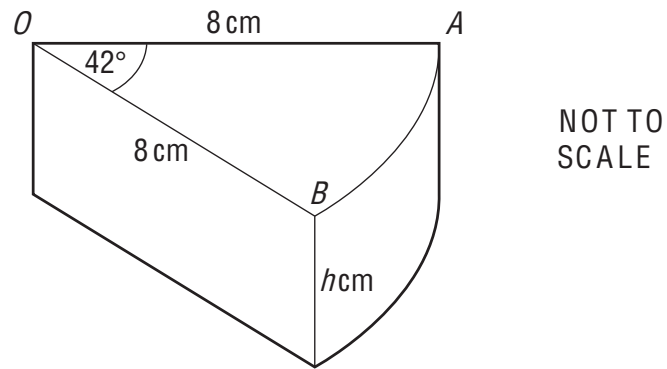## OCT/NOV

YEAR

2013

4

A wedge of cheese in the shape of a prism is cut from a cylinder of cheese of height *h* cm. The radius of the cylinder, *OA*, is 8 cm and the angle *AOB* = 42°.

(a) (i) The volume of the wedge of cheese is 90 cm³.

Show that the value of *h* is 3.84 cm correct to 2 decimal places.

Answer(a)(i)

[4]

(ii) Calculate the **total** surface area of the wedge of cheese.

Answer(a)(ii) .... cm² [5]

(b) A mathematically similar wedge of cheese has a volume of 22.5 cm³.

Calculate the height of this wedge.

Answer(b) .... cm [3]

7   Noma flies from Johannesburg to Hong Kong.
Her plane leaves Johannesburg at 18 45 and arrives in Hong Kong 13 hours and 25 minutes later.
The local time in Hong Kong is 6 hours ahead of the time in Johannesburg.

(a) At what time does Noma arrive in Hong Kong?

Answer(a) .... [2]

(b) Noma sleeps for part of the journey.
The time that she spends sleeping is given by the ratio

sleeping : awake = 3 : 4 .

Calculate how long Noma sleeps during the journey.
Give your answer in hours and minutes.

Answer(b) .... h .... min [2]

(c) (i) The distance from Hong Kong to Johannesburg is 10 712 km.
The time taken for the journey is 13 hours and 25 minutes.

Calculate the average speed of the plane for this journey.

Answer(c)(i) .... km/h [2]

(ii) The plane uses fuel at the rate of 1 litre for every 59 metres travelled.

Calculate the number of litres of fuel used for the journey from Johannesburg to Hong Kong.
Give your answer in standard form.

Answer(c)(ii) .... litres [4]

(d) The cost of Noma's journey is 10 148 South African Rand (R).
This is an increase of 18% on the cost of the journey one year ago.

Calculate the cost of the same journey one year ago.

Answer(d) R .... [3]

0580/23

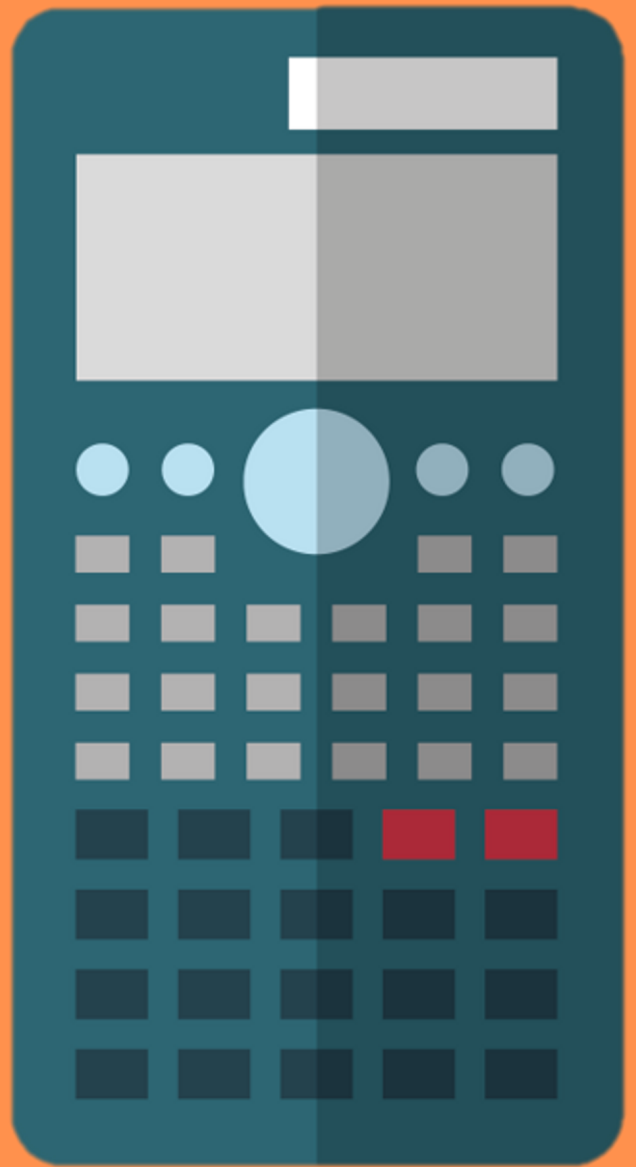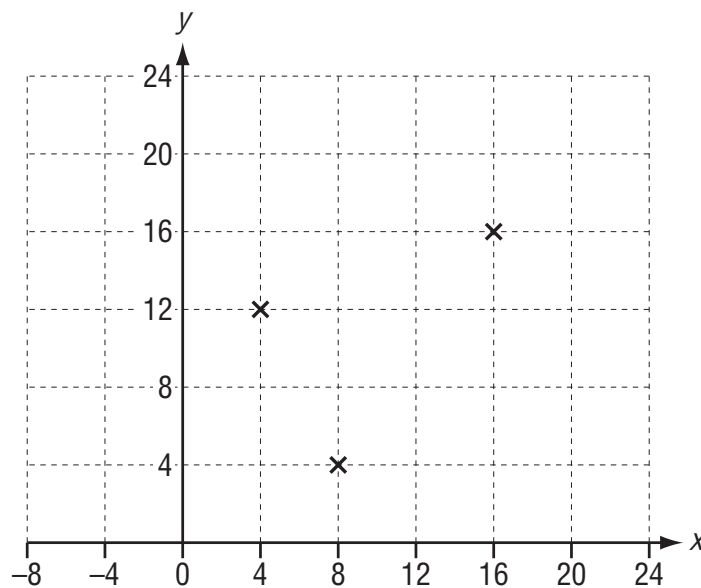## OCT/NOV

YEAR 2013

1 Christa had a music lesson every week for one year.
Each of the 52 lessons lasted for 45 minutes.

Calculate the total time that Christa spent in music lessons.
Give your time in hours.

Answer .... h [2]

_____

2 Three of the vertices of a parallelogram are at (4, 12), (8, 4) and (16, 16).

Write down the co-ordinates of two possible positions of the fourth vertex.

Answer (........... , ...) and (........... , ...) [2]

_____

3 Solve the equation $1 + 2x = -15$.

Answer $x =$ .... [2]

_____

4 Write the following in order of size, smallest first.

$$\cos 100° \qquad \tan 100° \qquad \frac{1}{100} \qquad 100^{-0.1}$$

Answer .... < .... < .... < .... [2]

_____

12 Write the answer to the following calculations in standard form.

(a) $600 \div 8000$

Answer(a) .... [2]

(b) $10^8 - 7 \times 10^6$

Answer(b) .... [2]

13
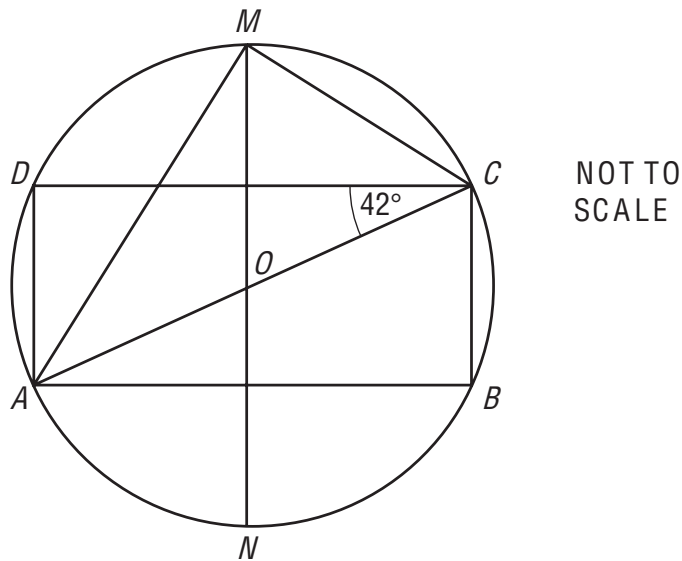
The vertices of the rectangle *ABCD* lie on a circle centre *O*.
MN is a line of symmetry of the rectangle.
AC is a diameter of the circle and angle *ACD* = 42°.

Calculate

(a) angle *CAM*,

Answer(a) Angle *CAM* = ... [2]
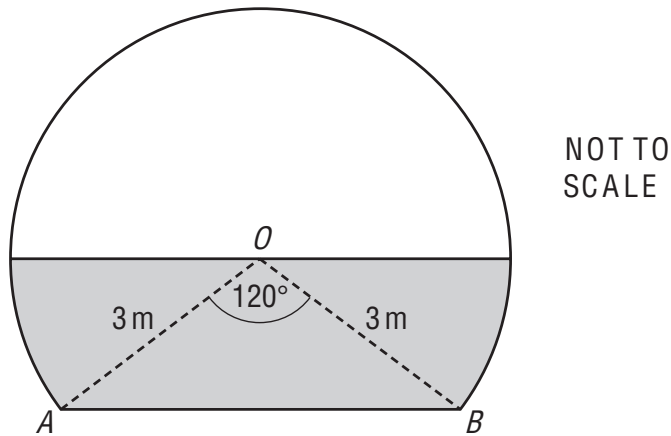
(b) angle *DCM*.

Answer(b) Angle *DCM* = ... [2]

16 The diagram shows the entrance to a tunnel.
The circular arc has a radius of 3 m and centre *O*.
AB is horizontal and angle *AOB* = 120°.

NOT TO
SCALE

O

120°

3 m   3 m

A   *B*

During a storm the tunnel filled with water, to the level shown by the shaded area in the diagram.

(a) Calculate the shaded area.

Answer(a) .... m² [4]

(b) The tunnel is 50 m long.

Calculate the volume of water in the tunnel.

Answer(b) .... m³ [1]

                   [Turn over
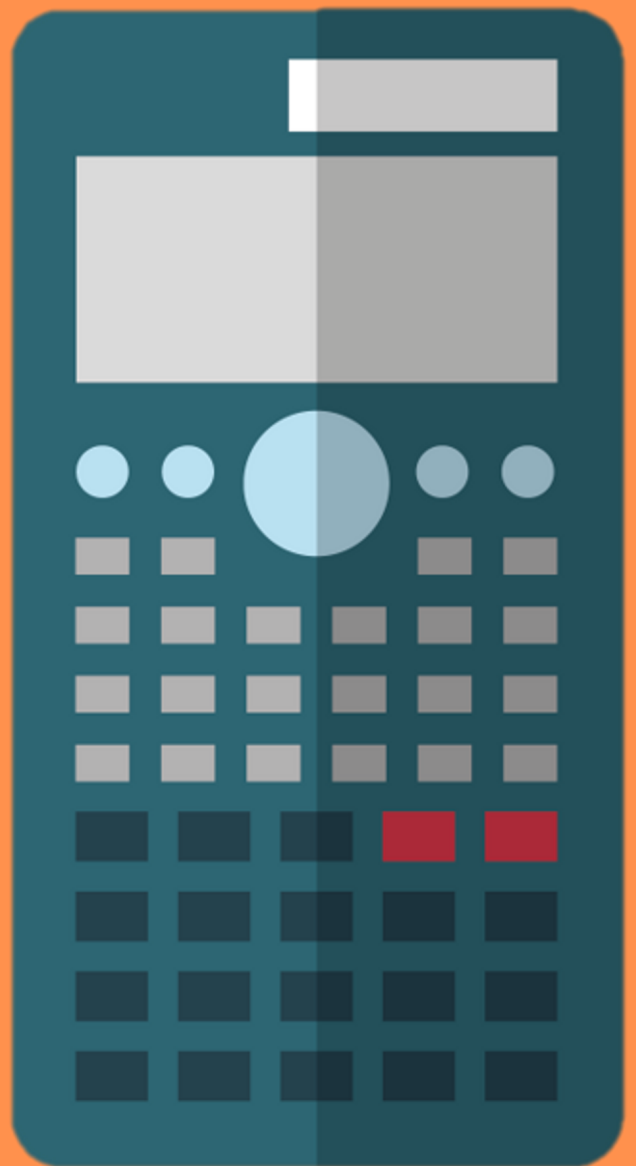
0580/43
OCT/NOV
YEAR
2013

www.Q8Maths.com

1 (a) (i) In a camera magazine, 63 pages are used for adverts.
The ratio   number of pages of adverts : number of pages of reviews = 7 : 5 .

Calculate the number of pages used for reviews.

Answer(a)(i) .... [2]

(ii) In another copy of the magazine, 56 pages are used for reviews and for photographs.
The ratio   number of pages of reviews : number of pages of photographs = 9 : 5 .

Calculate the number of pages used for photographs.

Answer(a)(ii) .... [2]

(iii) One copy of the magazine costs $4.90 .
An annual subscription costs $48.80 for 13 copies.

Calculate the percentage discount by having an annual subscription.

*Answer(a)*(iii) .... % [3]

(b) In a car magazine, 25% of the pages are used for selling second-hand cars,

$62\frac{1}{2}$% of the **remaining** pages are used for features,

and the other 36 pages are used for reviews.

Work out the total number of pages in the magazine.

Answer(b) .... [4]

3 A rectangular metal sheet measures 9 cm by 7 cm.
A square, of side x cm, is cut from each corner.
The metal is then folded to make an open box of height x cm.
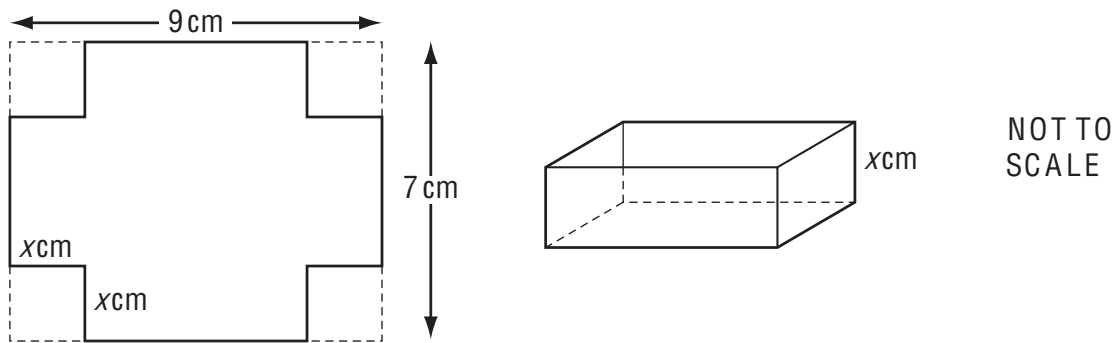
(a) Write down, in terms of x, the length and width of the box.

Answer(a) Length = ...

Width = ... [2]

(b) Show that the volume, V, of the box is $4x^3 - 32x^2 + 63x$.

Answer(b)

[2]

(c) Complete this table of values for $V = 4x^3 - 32x^2 + 63x$.

x	0	0.5	1	1.5	2	2.5	3	3.5
V	0		35	36	30		9	0

[2]

(d) On the grid opposite, draw the graph of $V = 4x^3 - 32x^2 + 63x$ for $0 \leqslant x \leqslant 3.5$.
Three of the points have been plotted for you.
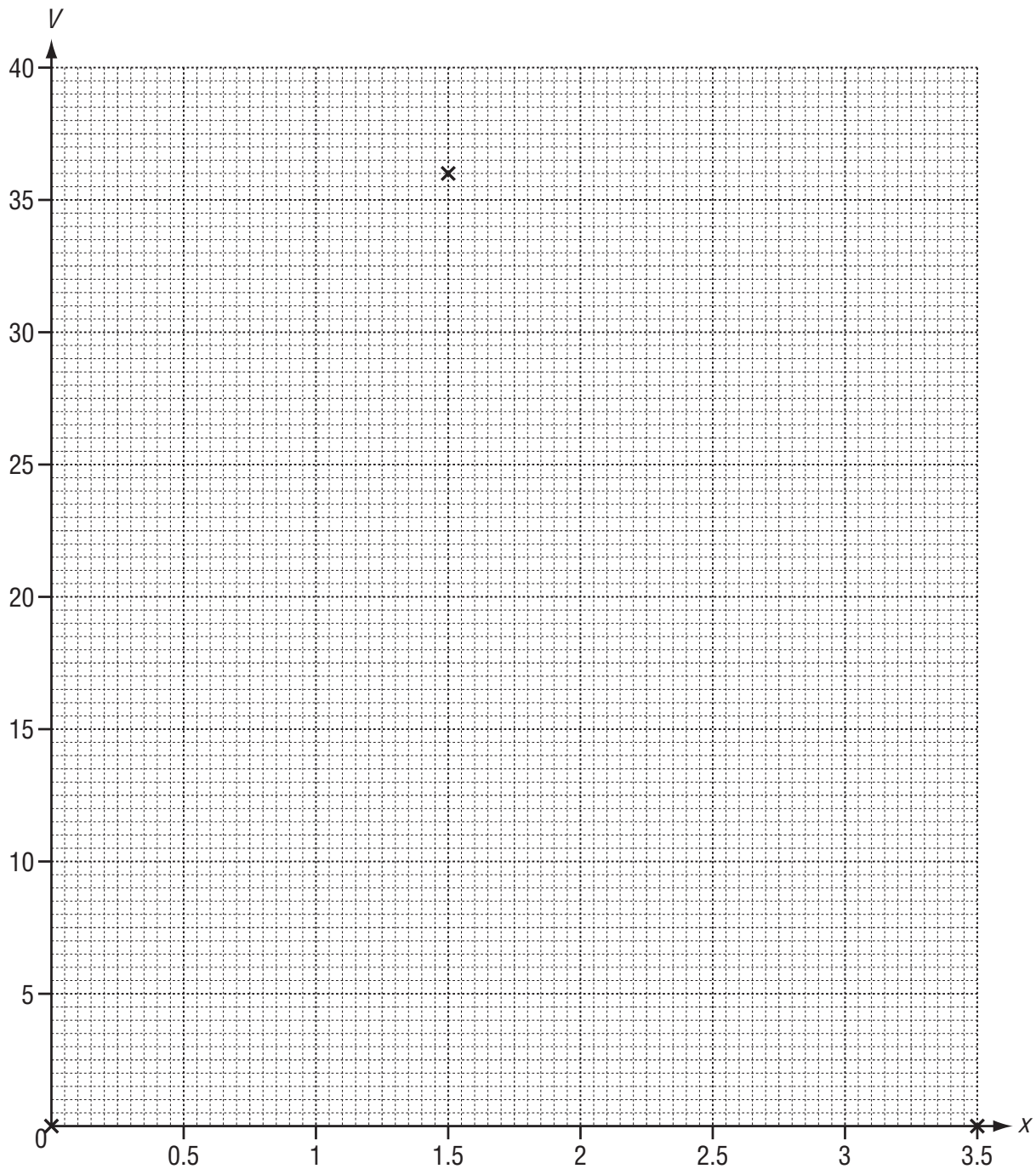
[3]

(e) The volume of the box is at least $30\,\text{cm}^3$.
Write down, as an inequality, the possible values of x.

Answer(e) .... [2]

(f) (i) Write down the maximum volume of the box.

Answer(f)(i) .... cm^3 [1]

(ii) Write down the value of x which gives the maximum volume.

Answer(f)(ii) .... [1]

4 **(a)** One angle of an isosceles triangle is 48°.

Write down the possible pairs of values for the remaining two angles.

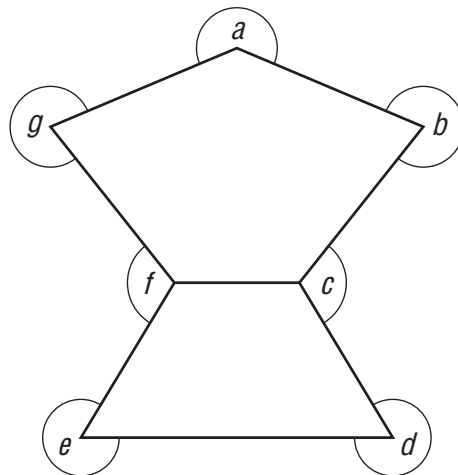*Answer(a)* .... and ....

.... and .... [2]

(b) Calculate the sum of the interior angles of a pentagon.

Answer(b) .... [2]

(c) Calculate the sum of the angles *a*, *b*, *c*, *d*, *e*, *f* and *g* shown in this diagram.

NOT TO SCALE

Answer(c) .... [2]

(d) The trapezium, *ABCD*, has four angles as shown.
All the angles are in degrees.

B
C

$3y - 20$ $4x - 5$

NOT TO
SCALE

$2x + 5$ $x + y - 10$

A   D
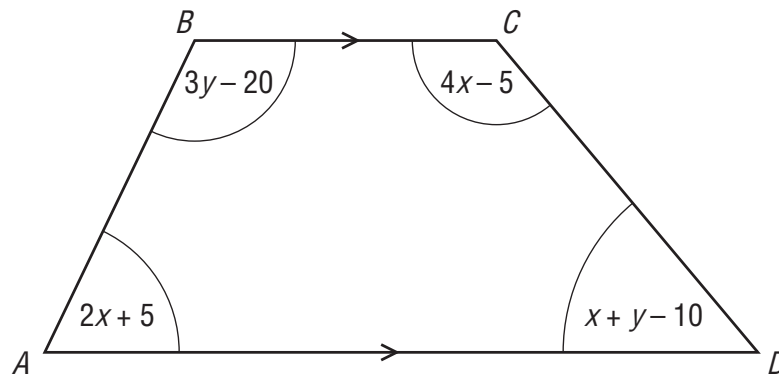
(i) Show that $7x + 4y = 390$.

Answer(d)(i)

[1]

(ii) Show that $2x + 3y = 195$.

Answer(d)(ii)

[1]

(iii) Solve these simultaneous equations.

Answer(d)(iii) *x* = ...

y = ... [4]

(iv) Use your answer to **part (d)(iii)** to find the sizes of all four angles of the trapezium.

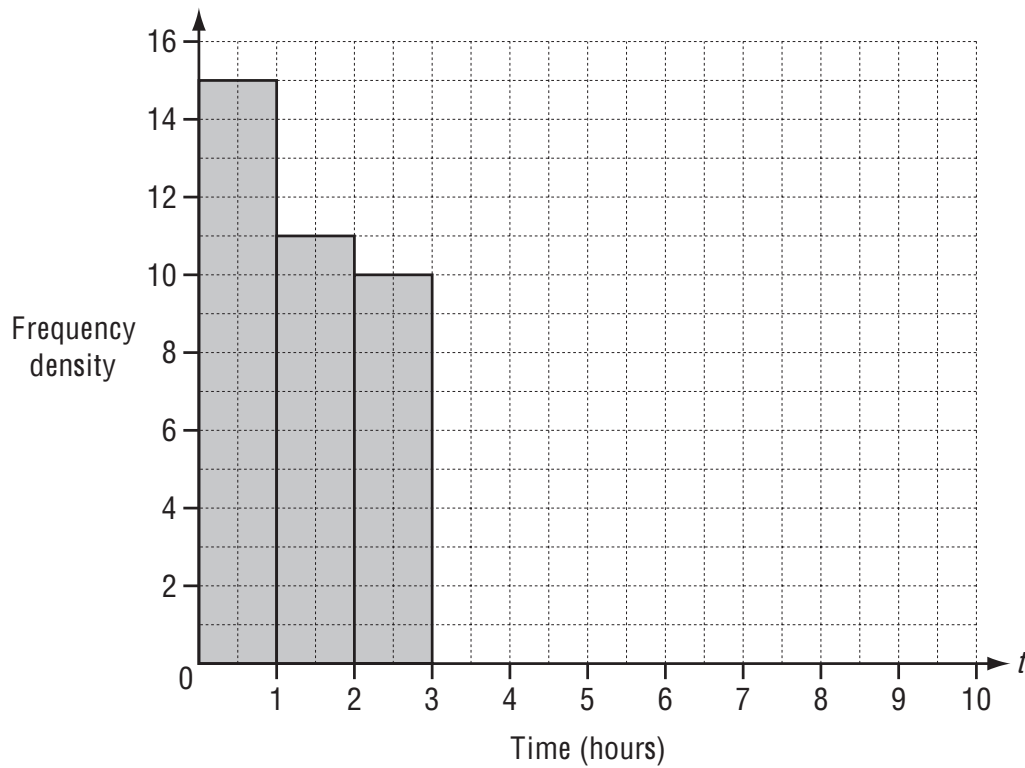*Answer(d)*(iv) .... , ... , ... , ... [1]

5 **(a)** 80 students were asked how much time they spent on the internet in one day.
This table shows the results.

Time (t hours)	$0 < t \leqslant 1$	$1 < t \leqslant 2$	$2 < t \leqslant 3$	$3 < t \leqslant 5$	$5 < t \leqslant 7$	$7 < t \leqslant 10$
Number of students	15	11	10	19	13	12

(i) Calculate an estimate of the mean time spent on the internet by the 80 students.
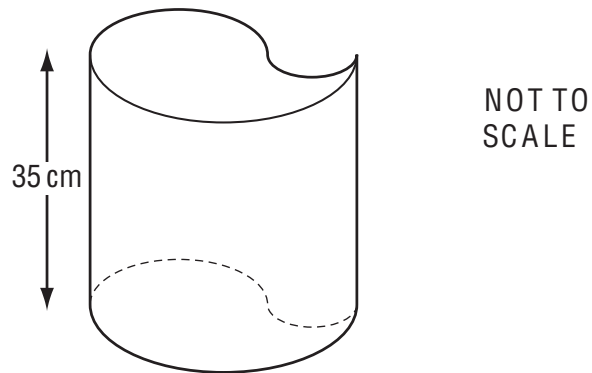
Answer(a)(i) .... hours [4]

(ii) On the grid, complete the histogram to show this information.
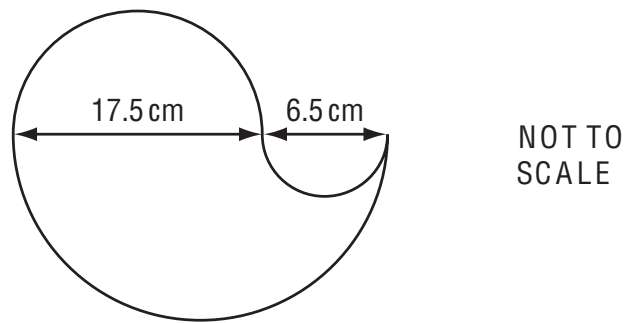

[4]

6 Sandra has designed this open container.
The height of the container is 35 cm.

35 cm

NOT TO
SCALE

The cross section of the container is designed from three semi-circles with diameters 17.5 cm, 6.5 cm and 24 cm.

17.5 cm   6.5 cm

NOT TO
SCALE

(a) Calculate the area of the cross section of the container.

Answer(a) .... cm^2 [3]

(b) Calculate the external surface area of the container, including the base.
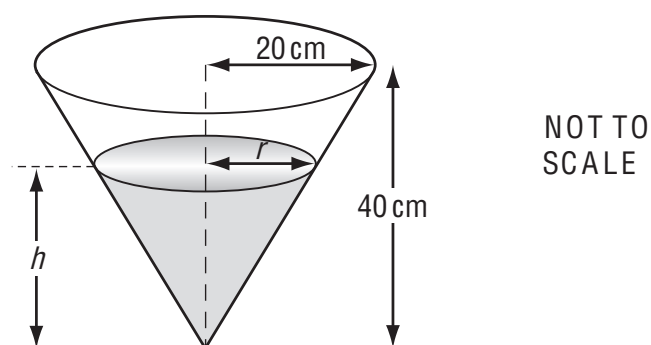
Answer(b) .... cm^2 [4]

0580/43/O/N/13

(c) The container has a height of 35 cm.

Calculate the capacity of the container.
Give your answer in litres.

Answer(c) .... litres [3]

(d) Sandra's container is completely filled with water.
All the water is then poured into another container in the shape of a cone.
The cone has radius 20 cm and height 40 cm.

NOT TO
SCALE

(i) The diagram shows the water in the cone.

Show that $r = \dfrac{h}{2}$.

Answer(d)(i)

[1]

(ii) Find the height, *h*, of the water in the cone.
[The volume, *V*, of a cone with radius *r* and height *h* is $V = \frac{1}{3}\pi r^2 h$.]

Answer(d)(ii) *h* = ... cm [3]