Paper 2 and Paper 3 Preparation Paper

AQA Higher

Corbettmaths

Ensure you have: Pencil, pen, ruler, protractor, pair of compasses and eraser

You will need a calculator

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this test

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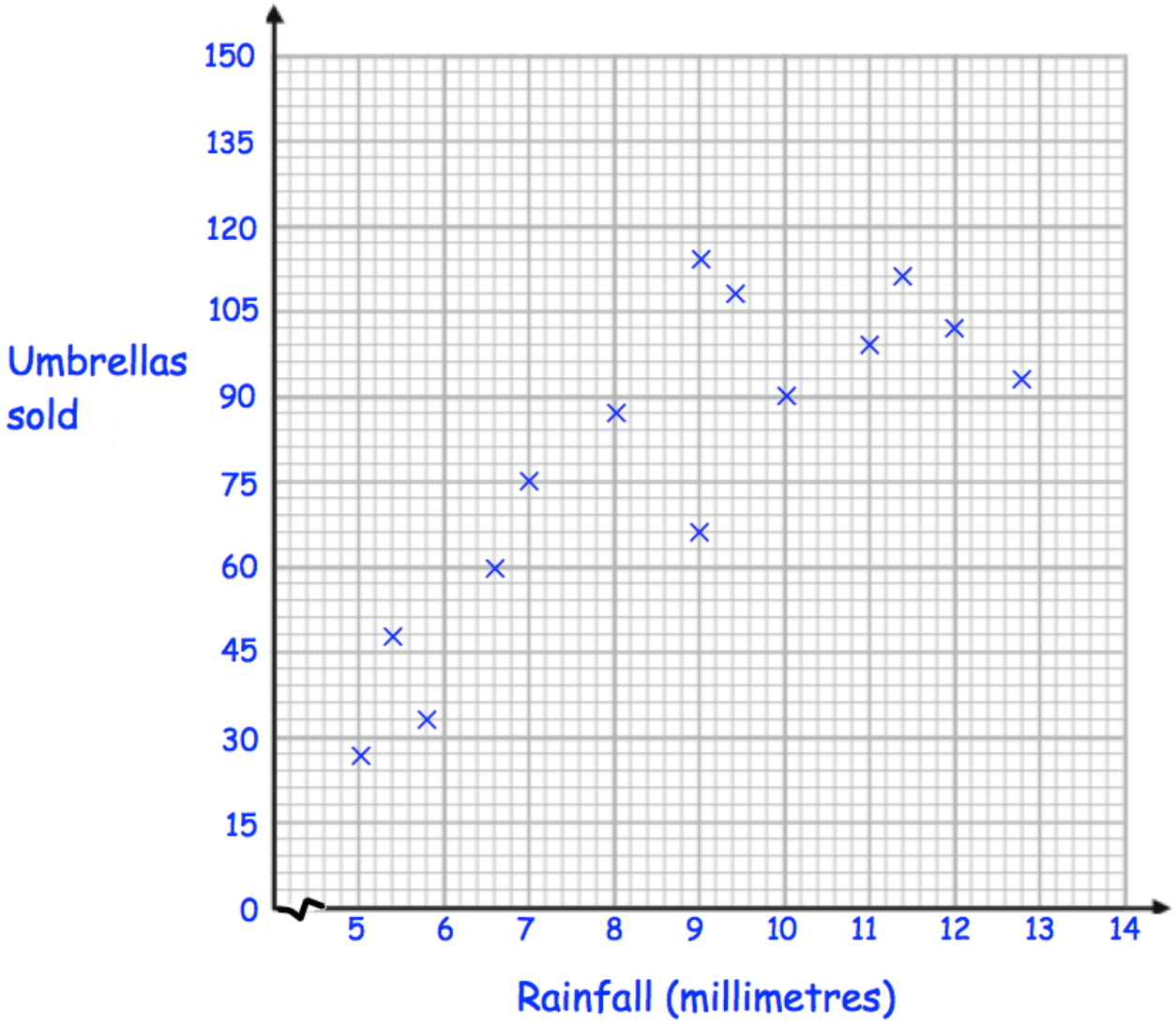
1. A shop sells umbrellas.

The scatter graph shows information about the number of umbrellas sold each week and the rainfall that week, in millimetres.



(a) Describe the relationship between the rainfall and umbrellas sold.

.....

.....

(1)

(b) What is the greatest amount of rainfall in one week?

.....

(1)

In another week, there was 6mm of rain.

(c) Estimate the number of umbrellas sold.

.....

(2)

(d) Explain why it may **not** be appropriate to use your line of best fit to estimate the number of umbrellas sold in a week with 25mm of rainfall.

.....

.....

(1)

---

2. (a) Write 5930000000 in standard form.

.....

(1)

(b) Write 8.024×10^{-4} as an ordinary number.

.....

(1)

(c) $c = 2 \times 10^6$ and $y = 6 \times 10^5$

$$w^2 = \frac{cy}{c - y}$$

Work out the value of w.
Give your answer in standard form correct to 2 significant figures.

.....

(3)

3. Use your calculator to find

$$\sqrt{39.3^2 - 1.24^2}$$

(a) Give all the figures in your calculator display.

.....

(1)

(b) Write your answer to 3 significant figures.

.....

(1)

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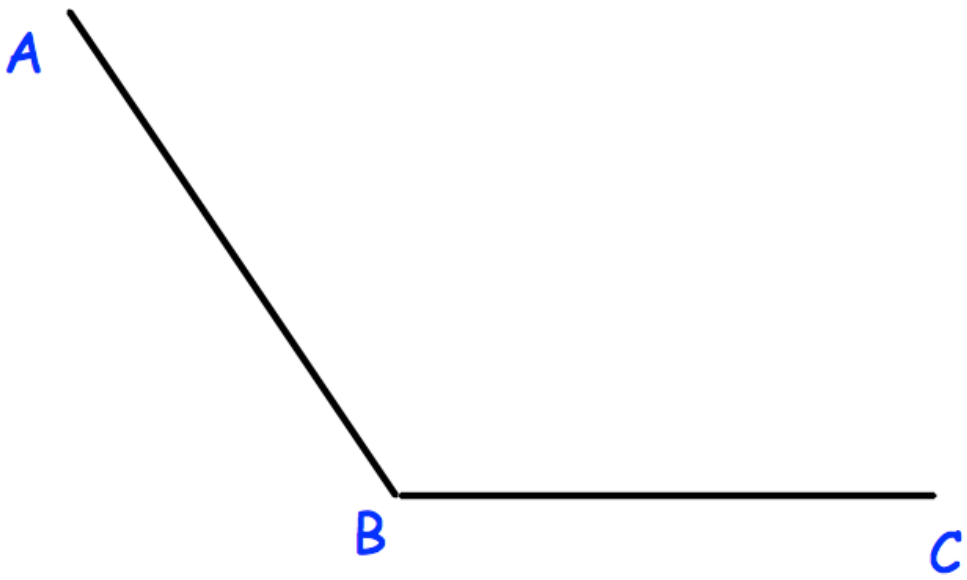
4. Using ruler and compasses, construct the bisector of angle ABC.

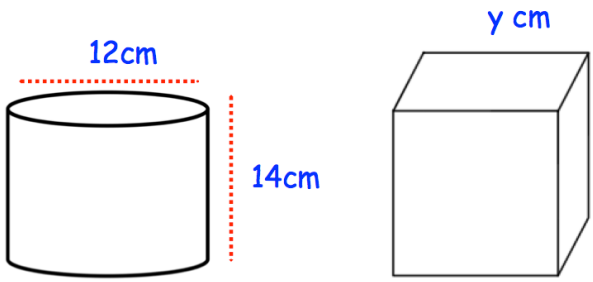


(2)

5. The diagram shows two lighthouses.
A boat is within than 8 miles of lighthouse A.
The same boat is within 6 miles of lighthouse B.
Shade the possible area in which the boat could be.

(2)

6.



A cylinder has diameter 12cm and height 14cm.
A cube has side length y cm.
The cylinder and cube has the same volume.

Find y.

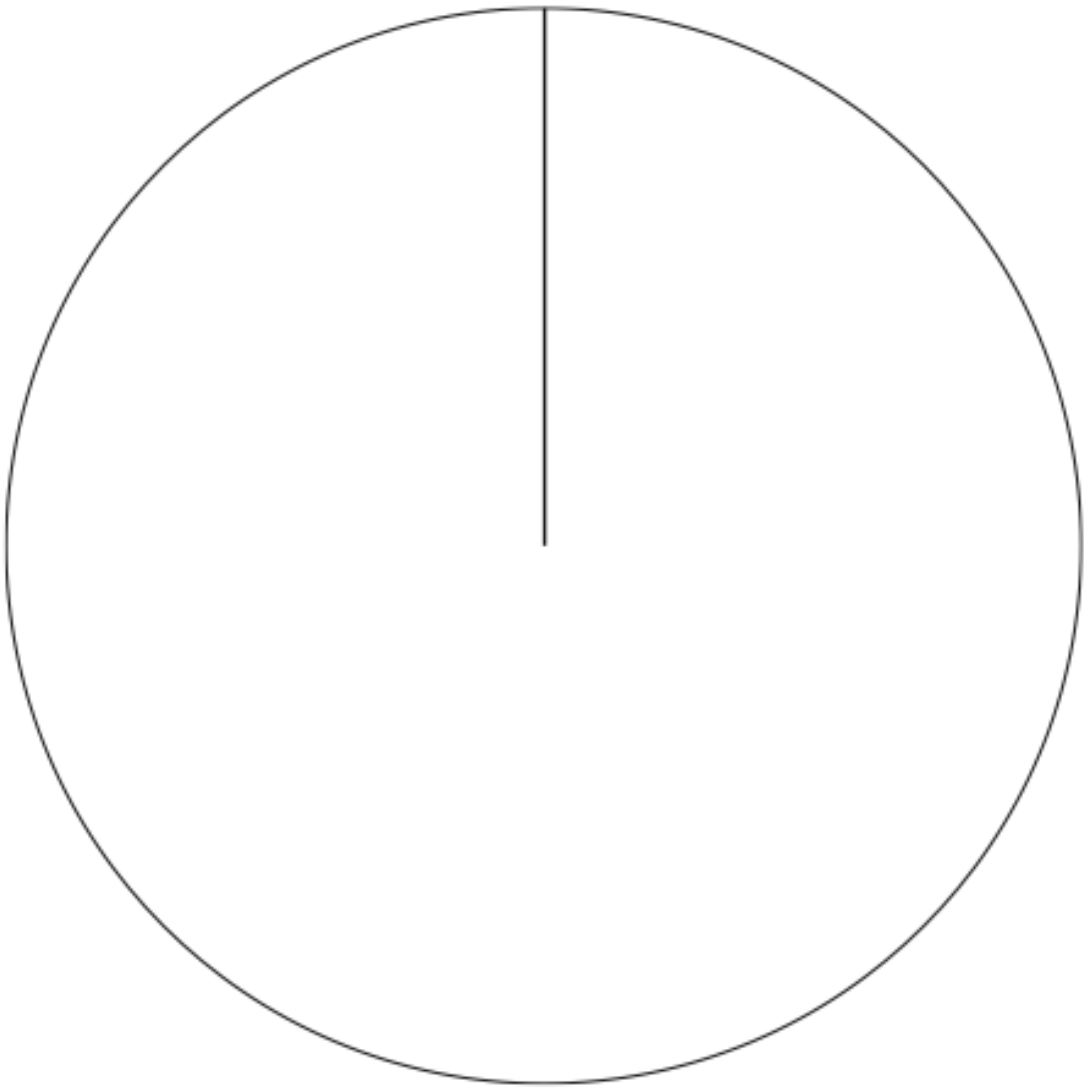
..... cm

(4)

7. The table gives information about the number of students in years 7 to 10.

Year	Frequency
7	200
8	140
9	220
10	160

Draw an accurate pie chart to show this information.



(4)

8. Find the Lowest Common Multiple (LCM) of 60 and 72.

.....

(2)

---

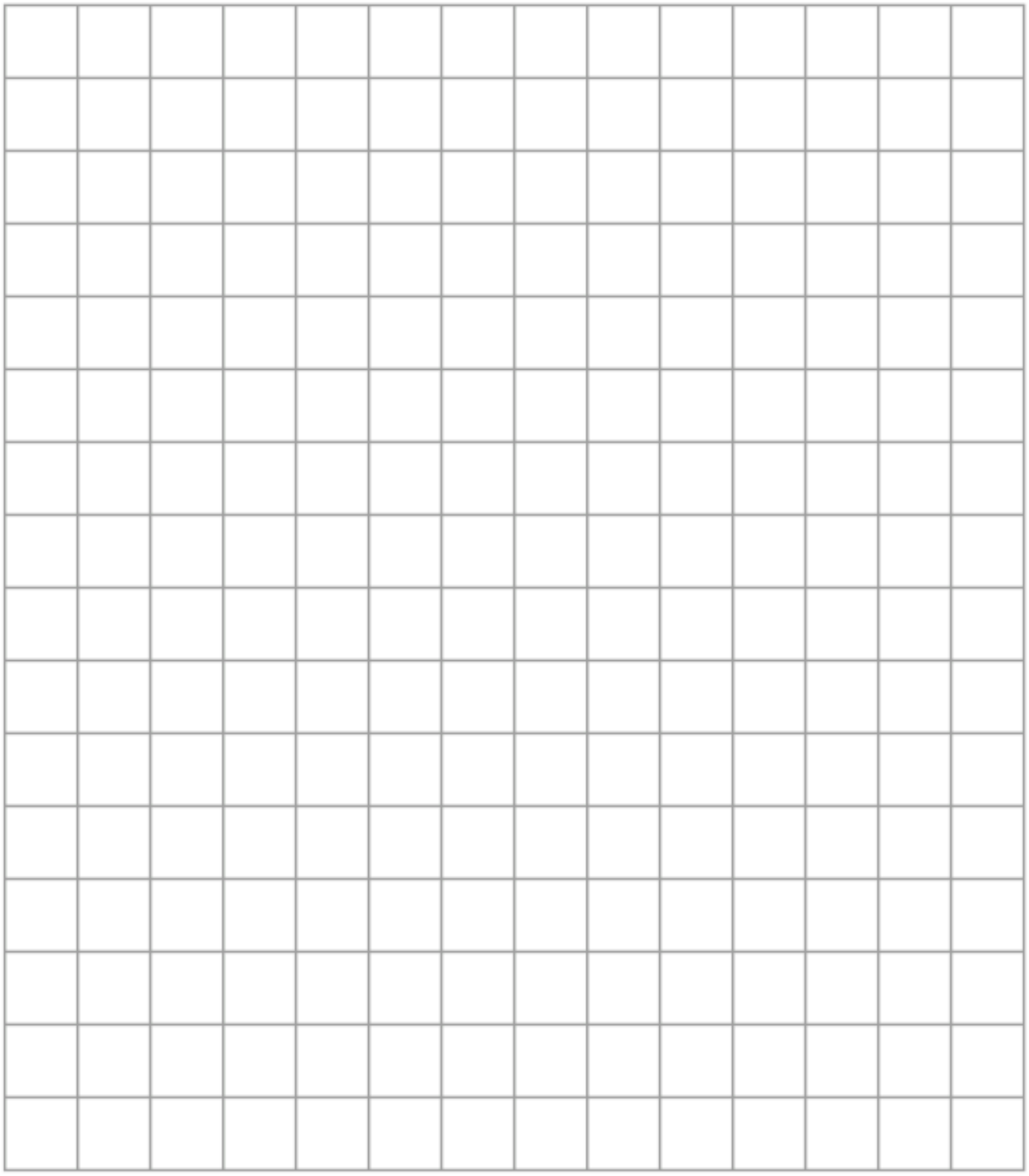
9. Make v the subject of the formula.

$$s = \frac{1}{2}(u + v)t$$

v = ...

(3)

10. On the grid, draw $x + 2y = 6$ for values of x from –2 to 2.



(4)

11. Solve the simultaneous equations

$$5x + 2y = -34$$
$$4x - 3y = -41$$

Do not use trial and improvement

x = ... y = ...

(4)

---

12. James has received two job offers.

A job in Milan which pays €55,000 a year.
A job in Boston which pays $64,000 a year.

The exchange rates were £1 = $1.42 and £1 = €1.25.

Which job offer has the highest salary?
Show working to explain your answer.

(3)

13. Terry goes to the Post Office to exchange money.

Terry changes $651 and €161.20 into pounds sterling.
The Post Office deducts their commission and gives Terry £528.

What is the percentage commission?

.....%
(4)

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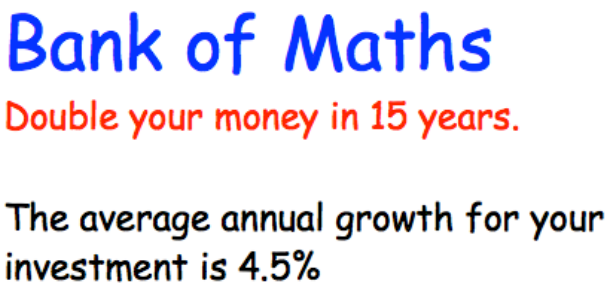
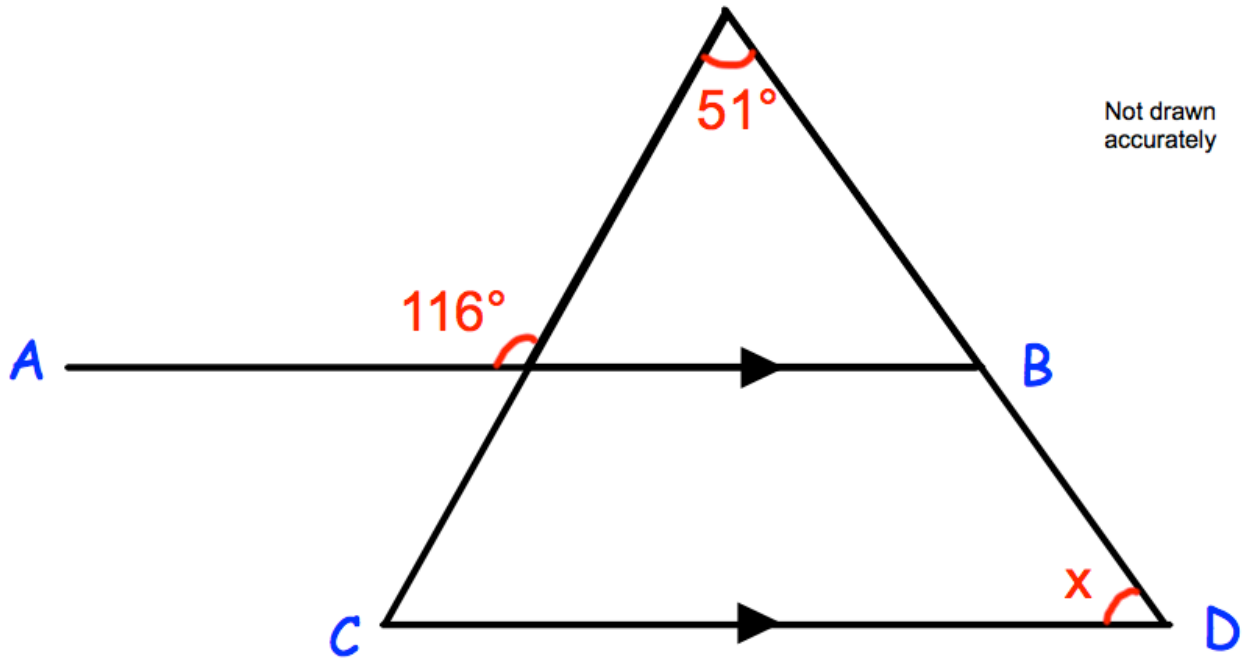
14. Martyn has some money to invest and sees this advert.



Will Martyn double his money in 15 years by investing his money with "Bank of Maths?"
You **must** show your workings.

(4)

15. In the diagram, AB is parallel to CD.



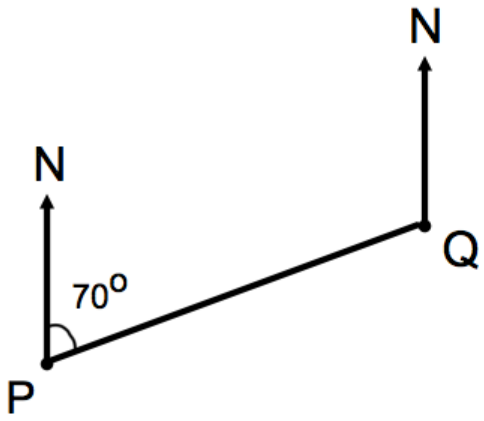
Work out the size of angle x.

You **must** show your workings.

.....°

(4)

16. The diagram shows the position of two airplanes, P and Q.



Not drawn accurately

The bearing of Q from P is 070^0.

Calculate the bearing of P from Q.

.....^{0}

(2)

---

17. The sum of the interior angles in a polygon is 7380^0.

Calculate the number of sides the polygon has.

.....

(2)

18. James has a bicycle.
Each wheel has diameter 45cm.

James cycles his bicycle in a straight line in the playground.
The front wheel makes 15 complete revolutions.

How far does the bicycle travel?
Give your answer in metres.

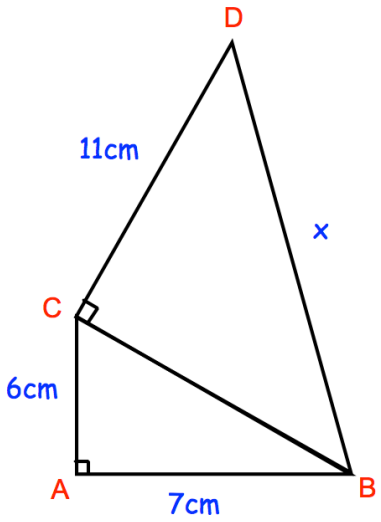
.....m
(4)

19. In a sale the price of a sofa is reduced by 70%.
The sale price is £255

Work out the price before the sale.

£.....
(3)

20. Below are two triangles, ABC and BCD.



Find x

.....cm

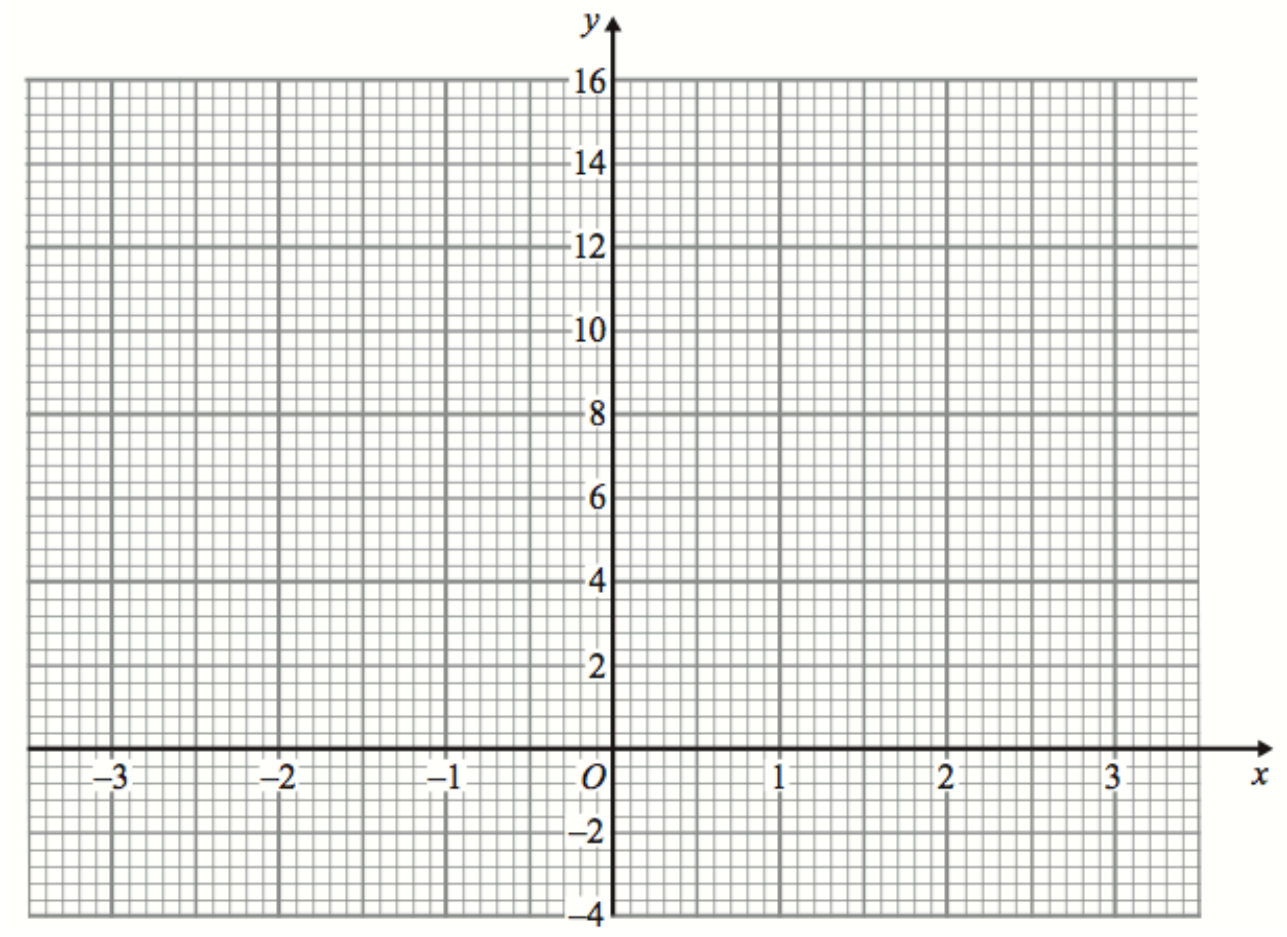
(4)

21. (a) Complete the table of values for $y = x^2 + 2x + 1$

x	-3	-2	-1	0	1	2	3
y							

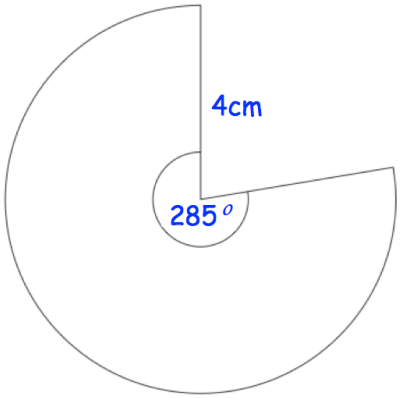
(2)

(b) On the grid, draw the graph of $y = x^2 + 2x + 1$ for the values of x from -3 to 3.



(2)

22.



Calculate the perimeter of the sector.

.....cm

(3)

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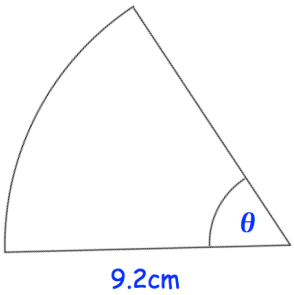
23. Shown is a sector of a circle with radius 9.2cm.



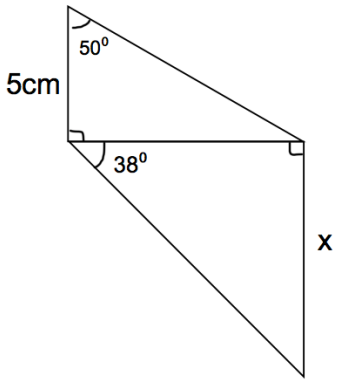
The area of the sector is 38.4cm²

Find the size of angle θ
Give your answer to 2 significant figures.

.....°

(3)

24. The diagram shows two right-angled triangles.



Calculate the value of x.

.....cm

(5)

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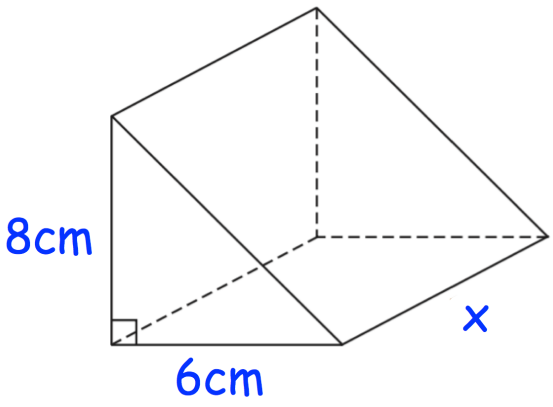
25. The diagram shows a solid triangular prism.



The prism is made from wood and has a mass of 643.8g
The density of wood is 1.85g/cm³

Calculate the length of the prism.

……..cm

(4)

26. Timothy weighs the mass of some oranges, in grams.

The table shows some information about his results.

Mass	Frequency
$20 < m \leq 25$	12
$25 < m \leq 30$	24
$30 < m \leq 35$	17
$35 < m \leq 40$	15
$40 < m \leq 45$	4

Work out an estimate for the mean mass of an orange.

.....grams
(4)

---

27. A group of friends have been surveyed.

38% have been to Canada.
80% have been to France.
11% have been to neither Canada or France.

(a) Find the percentage of the group that have been to Canada and France.

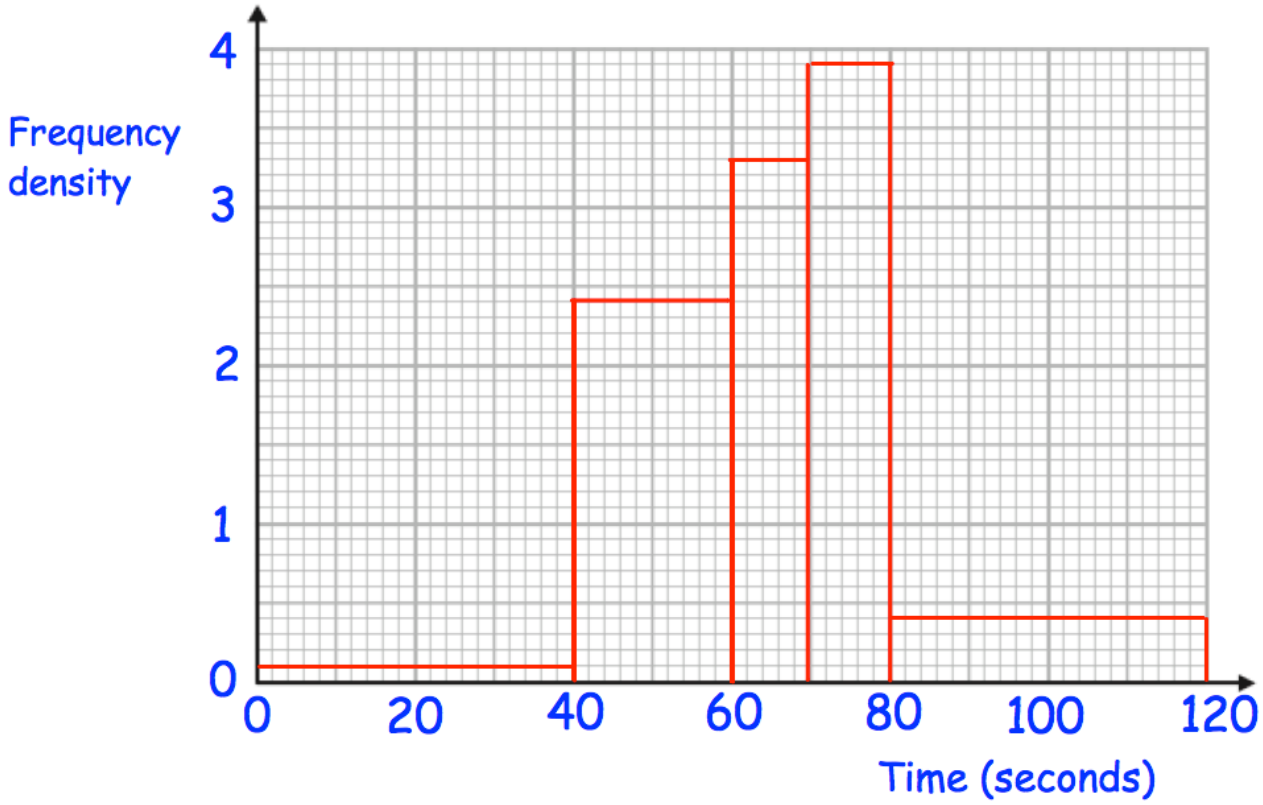
……%
(4)

One of the group, who has visited Canada is picked at random.

(b) Find the probability that they have been to France.

……
(2)

28. The histograms shows information about the time taken by 140 students to complete a puzzle.



(a) Complete this frequency table.

Time, t seconds	Frequency
$0 < t \leq 40$	4
$40 < t \leq 60$	
$60 < t \leq 70$	33
$70 < t \leq 80$	
$80 < t \leq 120$	16

(2)

(b) Calculate an estimate of the median.

.....

(3)

29. Mrs Hampton is potting plants.
She is using two mathematically similar pots, the smaller is 10cm tall and the larger 14cm tall.

She has two bags of soil, each containing 30 litres of soil.

With the first bag, Mrs Hampton fills 20 small pots using all of the soil in the bag.

How many large pots can be filled completely using the second bag of soil?

.....

(5)

---

30. Declan ran a distance of 200m in a time of 26.2 seconds.

The distance of 200m was measured to the nearest 10 metres.
The time of 26.2 was measured to the nearest tenth of a second.

Work out the upper bound for Declan's average speed.

.....m/s

(2)

31. (a) Solve $y^2 + 9y + 2 = 8y + 58$

.....

(2)

(b) Solve $5x^2 + 19x - 4 = 0$

.....

(2)

---

32. Solve the equation $x^2 - 2x - 9 = 0$

Give your answers to two decimal places.

x = ... or x = ...

(3)

33. The *n*th term of a sequence is 4n - 7

(a) Write down the first three terms of the sequence.

1st term ....., 2nd term ....., 3rd term .....

(2)

(b) What is the difference between the 150th and 151st terms?

.....

(1)

The last term of this sequence is 393.

(c) How many terms are there in this sequence?

.....

(2)

34. Here are the first 5 terms of a quadratic sequence

9 17 29 45 65

Find an expression, in terms of n, for the nth term of this quadratic sequence.

.....

(3)

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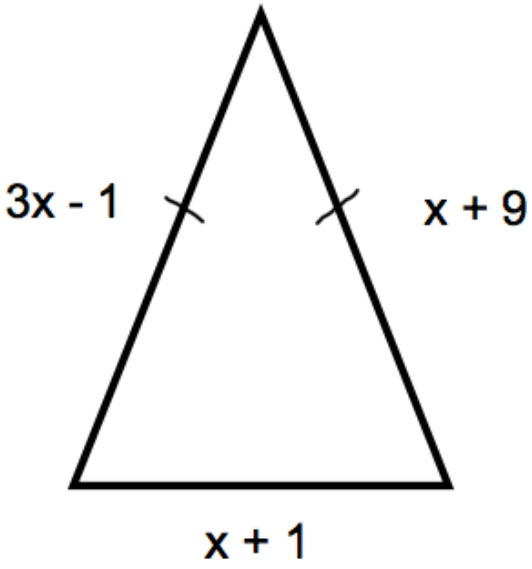
35. Shown below is an isosceles triangle. Each side is measured in centimetres.

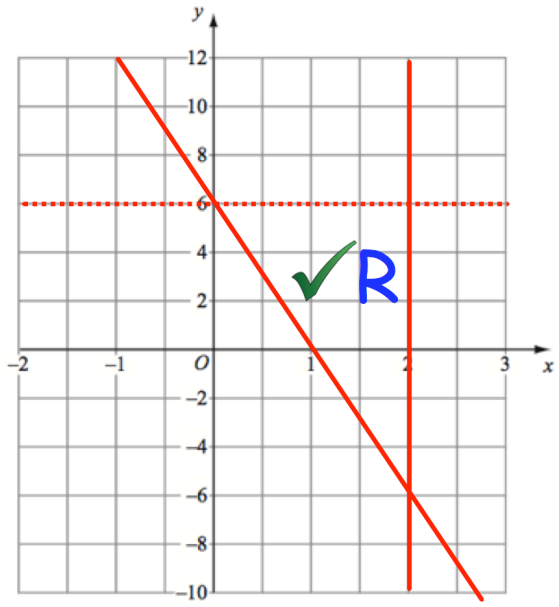


Find the perimeter of the triangle

.....

(4)

36.



The region labelled R satisfies three inequalities.

State the three inequalities

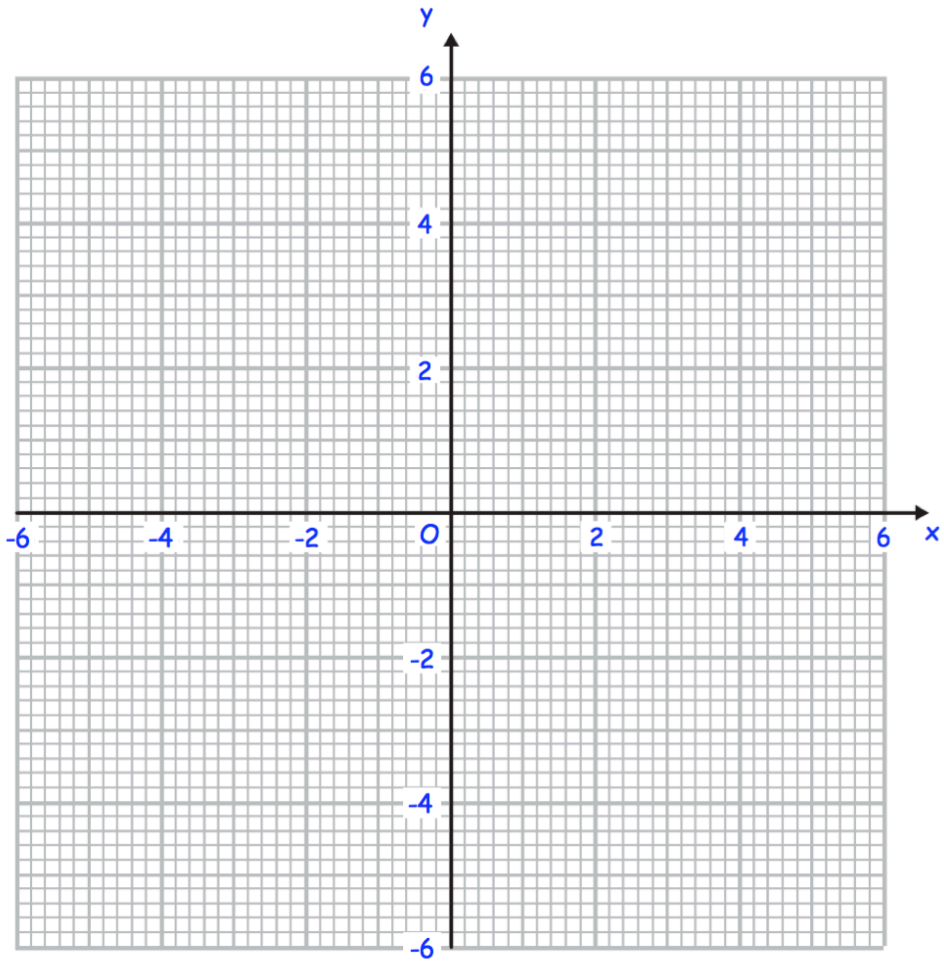
.....

.....

.....

(3)

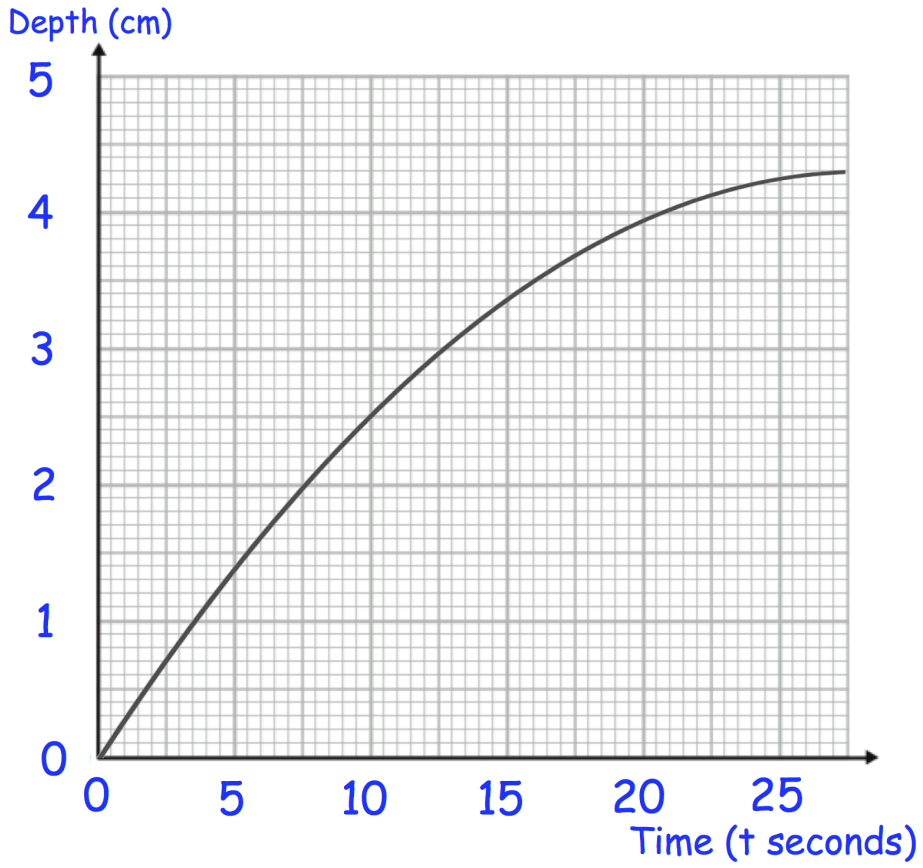
37. Draw the circle with equation $x^2 + y^2 = 16$



(2)

38. Jack is filling a container with water.

The graph shows the depth of the water, in centimetres, t seconds after the start of filling the container.



(a) Calculate an estimate for the gradient of the graph when t = 15 seconds.

.....

(3)

(b) Describe fully what your answer to (a) represents

.....

.....

(2)

(c) Explain why your answer to (a) is only an estimate

.....

(1)

39

The functions $f(x)$ and $g(x)$ are given by the following:

$$f(x) = 8 - 3x$$
$$g(x) = 4x$$

(a) Calculate the value of $gf(3)$

.....

(2)

(b) Find $f^{-1}(x)$

.....

(2)

40.

(a) Show that the equation $x^3 + 2x = 1$ has a solution between x = 0 and x = 1

(2)

(b) Show that the equation $x^3 + 2x = 1$ can be rearranged to give $x = \frac{1}{2} - \frac{x^3}{2}$

(1)

(c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \frac{1}{2} - \frac{x_n^3}{2}$ twice to find an estimate for the solution of $x^3 + 2x = 1$

(3)

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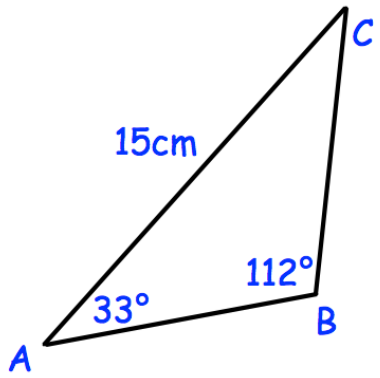
41. (a)



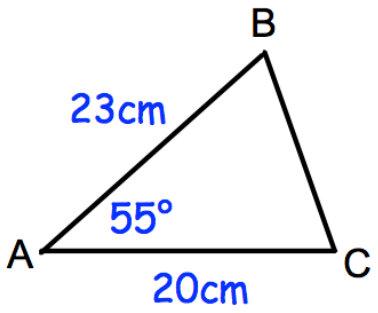
In triangle ABC the length of AC is 15cm.
Angle ABC = 112°
Angle BAC = 33°

Work out the length of BC.

.....cm

(3)

(b)

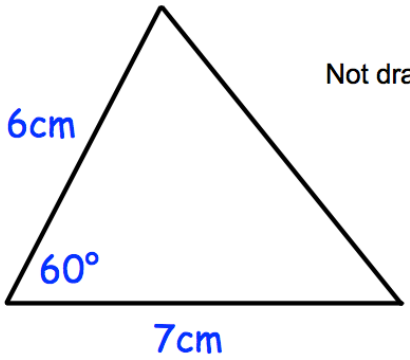


Calculate the length of BC.

.....cm

(3)

42.



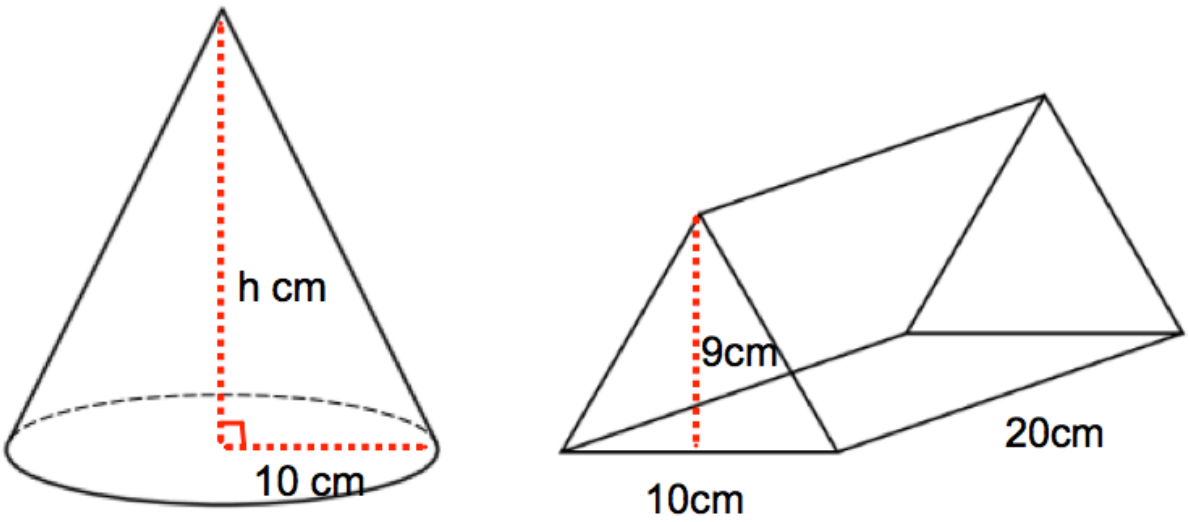
Not drawn is scale.

Calculate the area of the triangle.

.....cm²

(2)

43. Shown is a cone and a triangular prism.



Both solids have the same volume.

Calculate the height of the cone.

.....cm

(3)

44. There are 8 sweets in a bag.
Three sweets are red, three sweets are blue and two sweets are green.

Three sweets are selected at random **without** replacement.

Calculate the probability that the sweets are **not** all the same colour.

.....

(4)

---

45. Solve the simultaneous equations

$2x + y = 5$
$2x^2 + y^2 = 1148.$

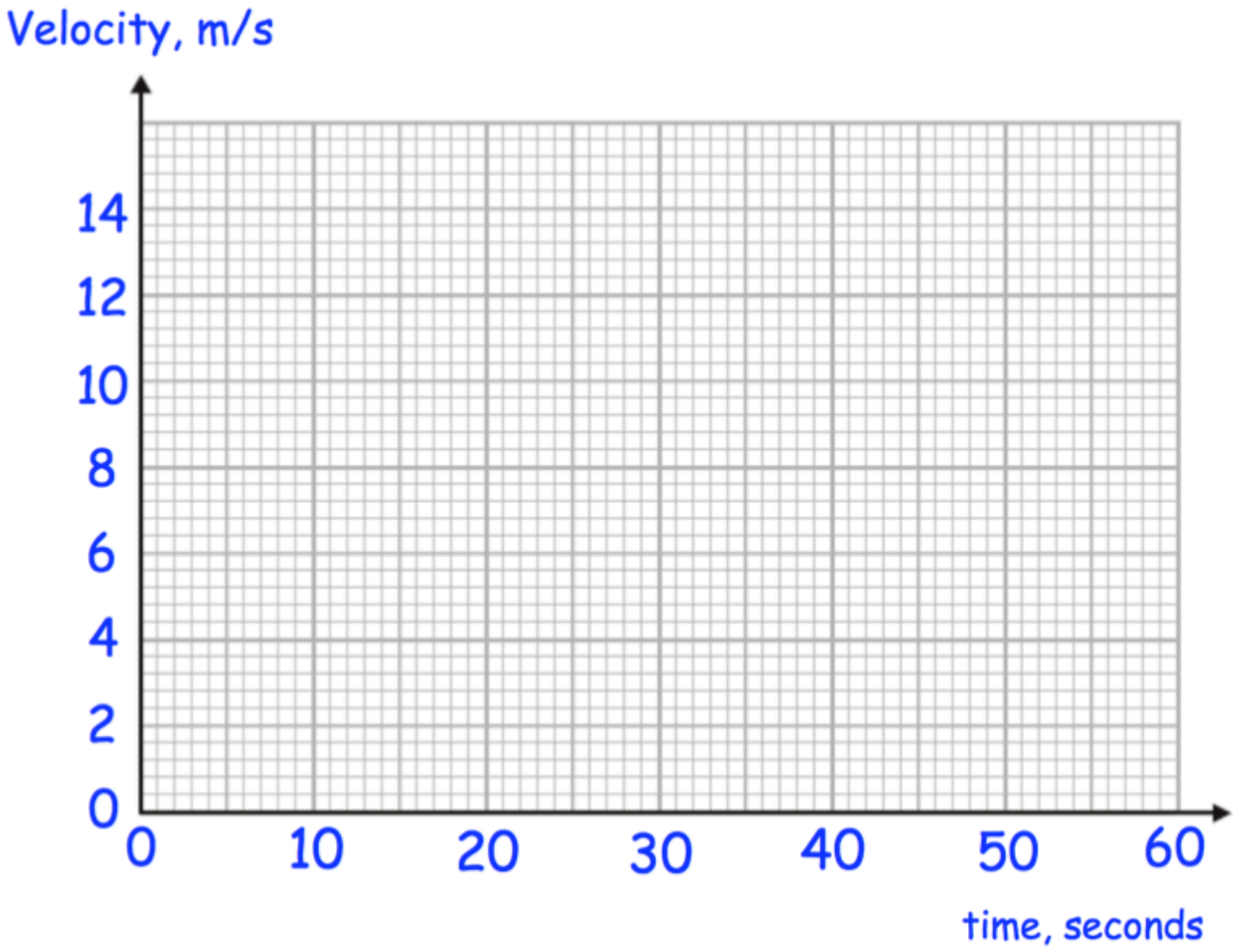
46. A remote control car drives in a straight line.

It starts from rest and travels with constant acceleration for 20 seconds reaching a velocity of 12m/s.

It then travels at a constant speed for 20 seconds.

It then slows down with constant deceleration of 4m/s^2.

(a) Draw a velocity time graph



(b) Using your velocity-time graph, work out the total distance travelled.

……..m

(2)

47. A supermarket sells Baked Beans in two different size cans.

215g

40p

395g

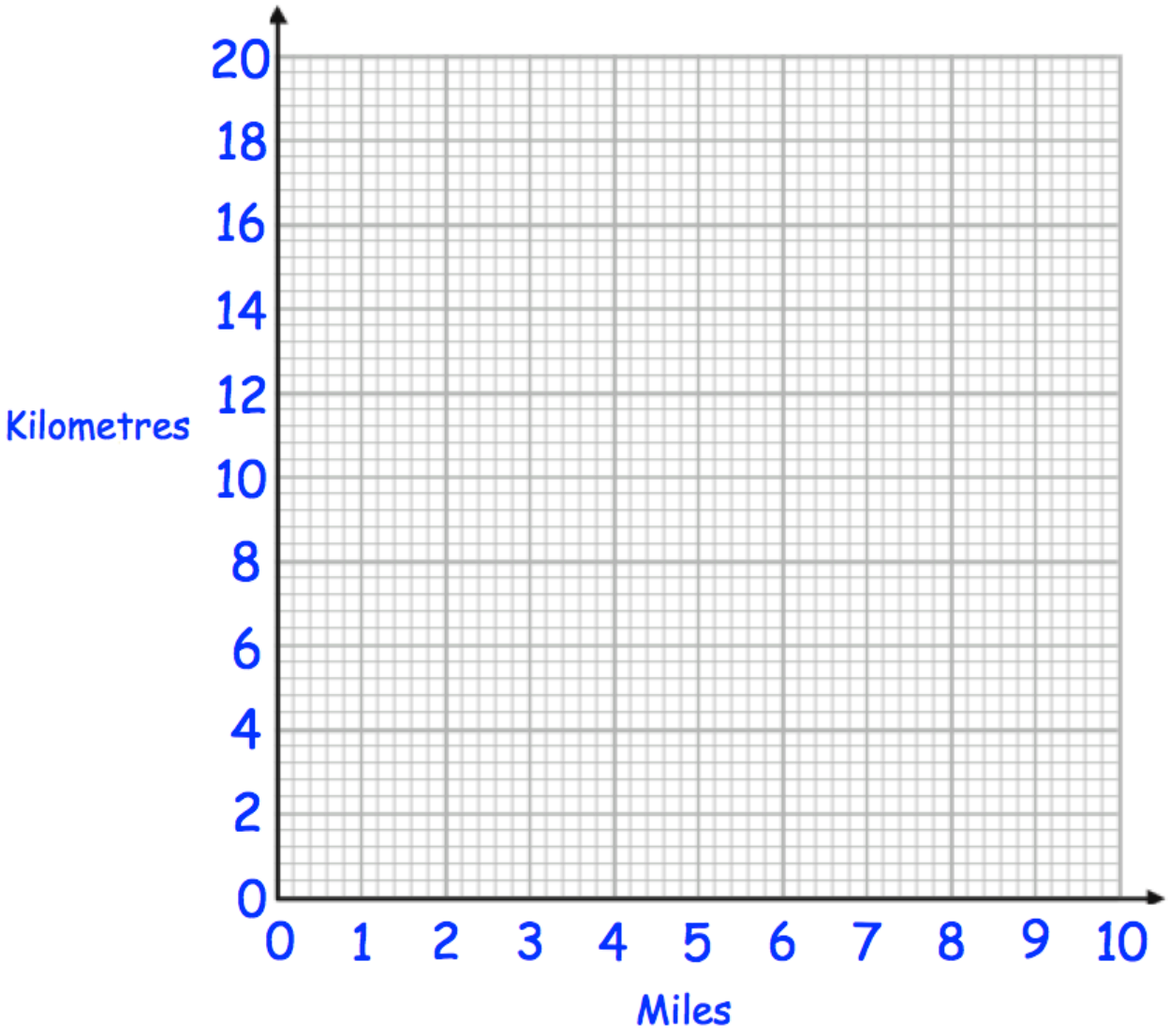
74p

Which size can is the best value for money?
You must show all your working.

(4)

48.

(a) Use the fact 5 miles = 8 kilometres to draw a conversion graph on the grid.



(2)

Use your graph to convert

(b) 8 miles to kilometres

.....km

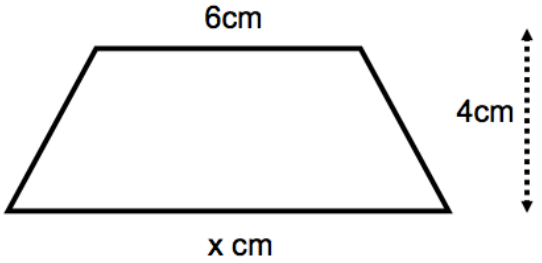
(1)

(c) 6 kilometres to miles

.....miles

(1)

49.



The area of the trapezium is 34cm².

Work out the value of x.

.....cm

(2)

50. 100 people study one language at a college.

Some people study French.
Some people study Spanish.
The rest of the people study German.

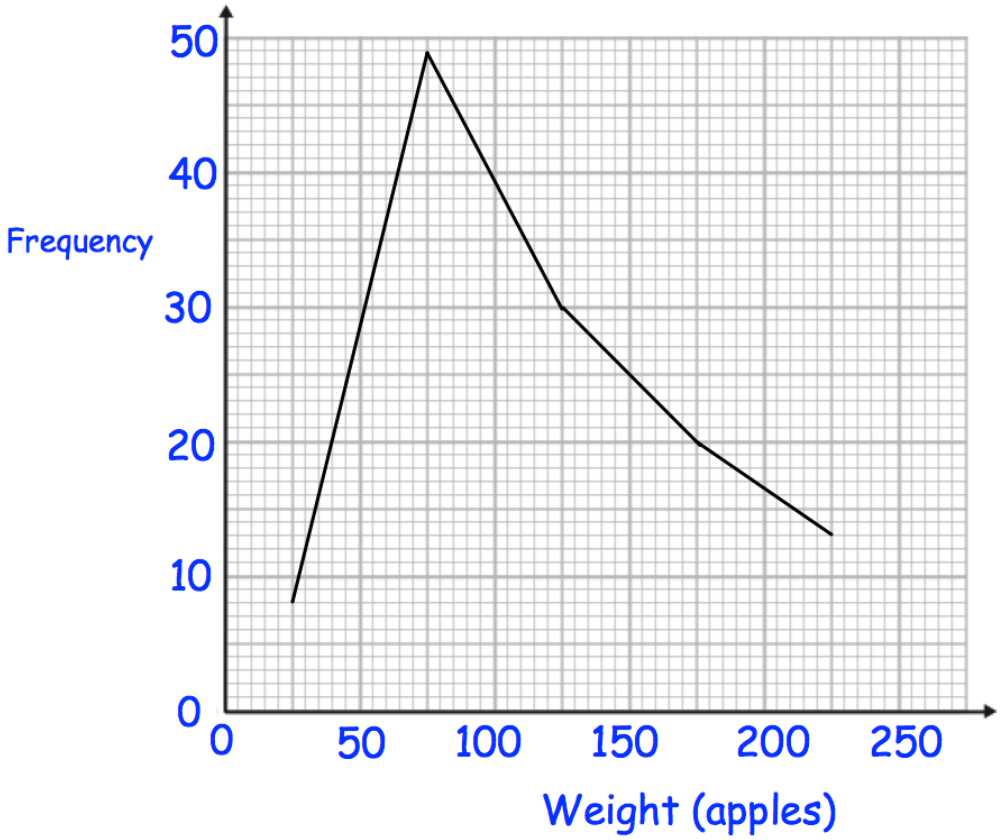
54 of the people are male.
20 of the 29 people who study Spanish are female.
31 people study German.
15 females study French.

Work out the number of males who study German.

.....

(4)

51. The frequency polygon shows the weights of 120 red apples.



The table shows the weights of 120 green apples.

Weight (kg)	Frequency
$0 < w \leq 50$	4
$50 < w \leq 100$	12
$100 < w \leq 150$	40
$150 < w \leq 200$	48
$200 < w \leq 250$	16

(a) Draw a frequency polygon to show this information on the diagram above.

(2)

(b) Compare the two distributions.

.....

.....

(2)

52. Jim picks a five digit even number.
The second digit is less than 8.
The fourth digit is a square number The first digit is a cube number.
How many different numbers could he pick?

.....

(3)

---

53. $v = u + at$

Work out a when $v = 62$, $u = 250$ and $t = 8$

.....

(3)

---

54. Nigel measures the time, t seconds, to complete a race as 15.4 seconds correct to the nearest tenth of a second.

Write down the error interval for t.

.....

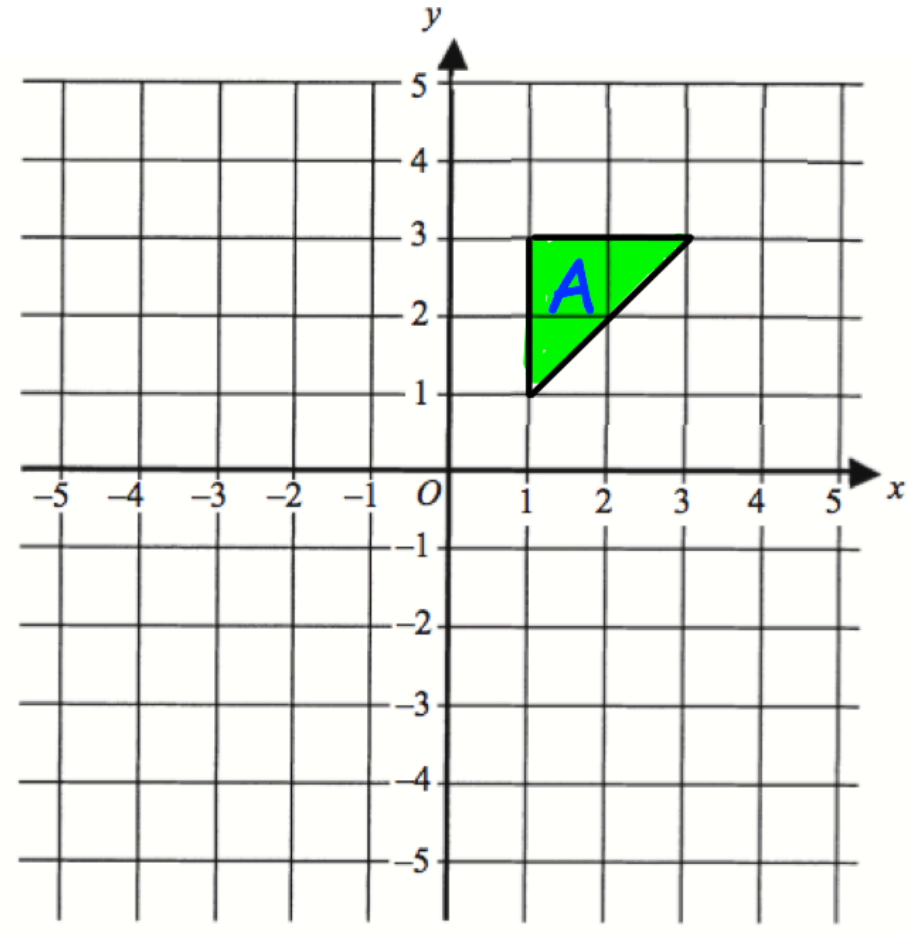
(2)

55. Expand and simplify $(x - 6)(x + 1)(x - 2)$

.....

(4)

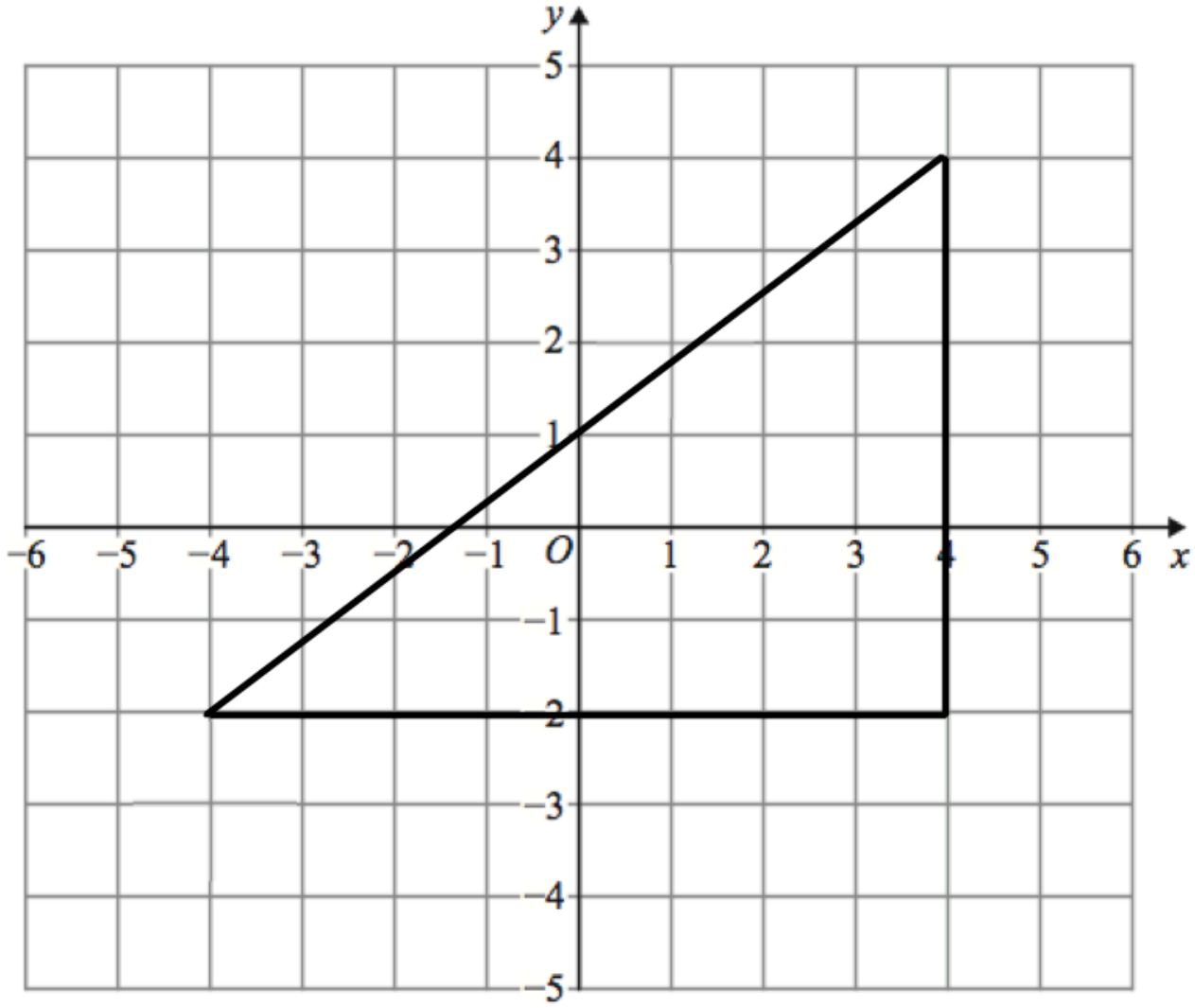
56.



Translate triangle A by the vector $\begin{pmatrix} -3 \\ 1 \end{pmatrix}$

(2)

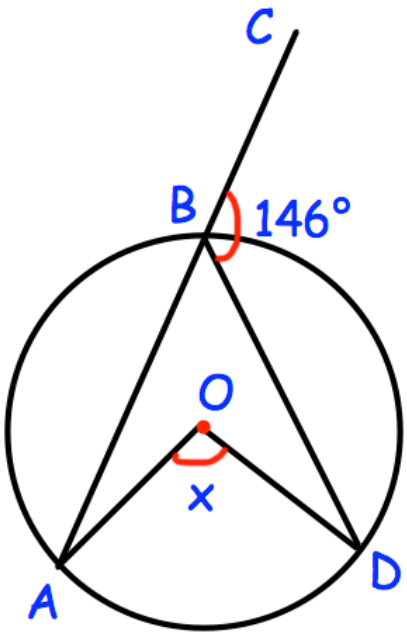
57.



Enlarge the triangle by scale factor –½, using centre of enlargement (2, 0)

(3)

58.



Shown is a circle with centre O.
ABC is a straight line.
Angle CBD is 146°

Find the size of angle AOD.

.....°

(3)

---

59. Factorise fully

$$w^2y + wy^2$$

.....

(2)

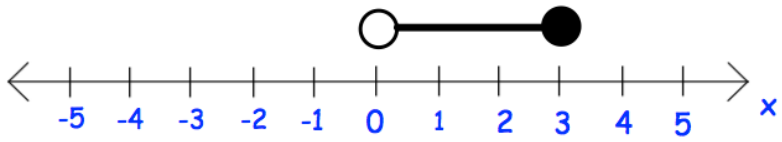
60. (a) x is an integer.

Write down all the solutions of the inequality $30 < 7x + 1 < 135$

.....

(3)

(b) Write down the inequality shown by the diagram.



.....

(2)

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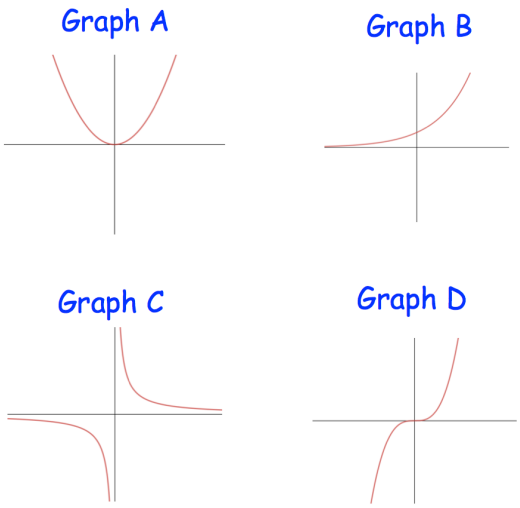
61. Solve

$$\frac{1}{x+3} - \frac{1}{x+1} = 2$$

.....

(5)

62. Match each graph to the correct equation



$y = x^2$ is graph **A**

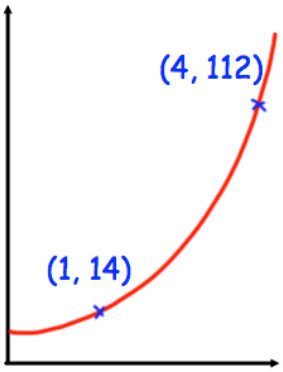
$y = x^3$ is graph ……..

$y = 2^x$ is graph ……..

$y = \frac{1}{x}$ is graph ……

(2)

63.



The sketch shows a curve with equation
$y = ab^x$ where a and b are constants and $b > 0$

The curve passes through the points (1, 14) and (4, 112)

Calculate the value of a and b

a = ...

b = ...

(3)

64. Write the numbers below in order.
Start with the smallest.

$\frac{11}{23}$ $0.4\dot{7}\dot{2}$ $\frac{5}{11}$

.....

(3)

65.

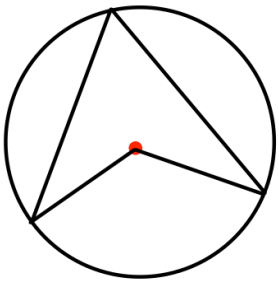
An object is placed on a table.
It exerts a force of 22 newtons on the table.

The pressure on the table is 500 newtons/m².
Calculate the area of the crate that is in contact with the table.
Include suitable units.

.....

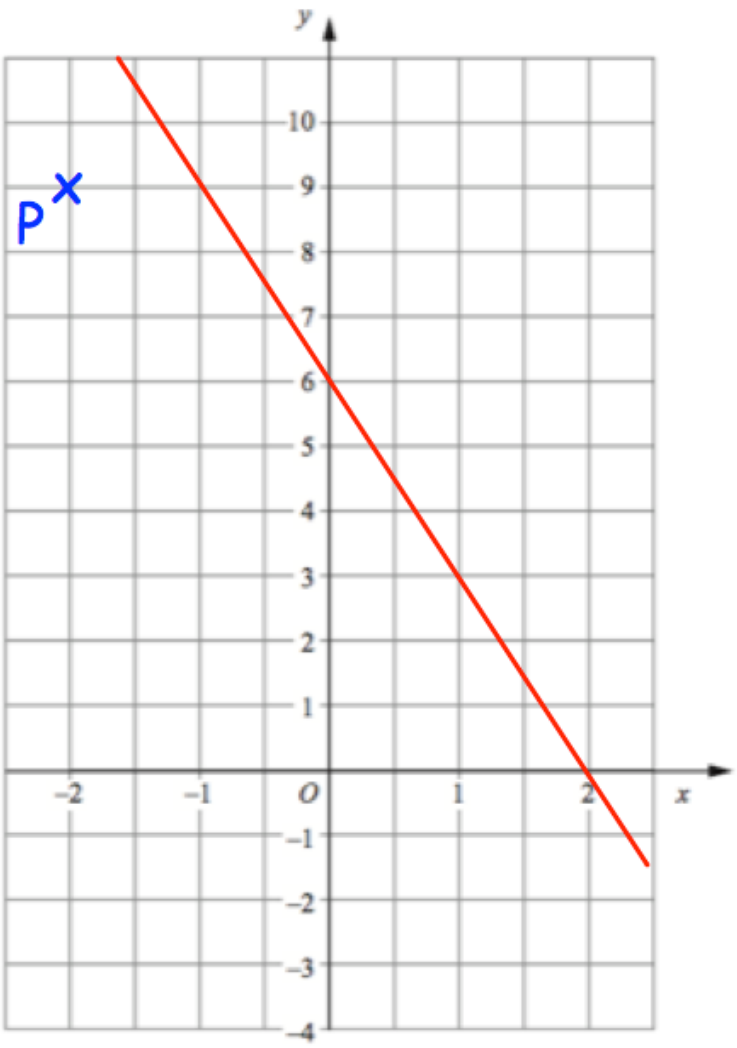
(3)

66.



Prove that the angle at the centre is twice the angle at the circumference.

67.



(a) Find the equation of L.

.....

(3)

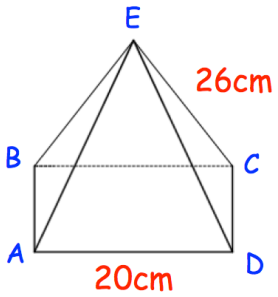
The point P has coordinates (–2, 9).

(b) Find an equation of the line that is parallel to L and passes through P.

.....

(2)

68. Shown below is a square based pyramid.
The apex E is directly over the centre of the base.



AD = 20cm
CE = 26cm

(a) Work out the length of AC

.....cm
(2)

(b) Calculate angle CAE

..... °
(2)

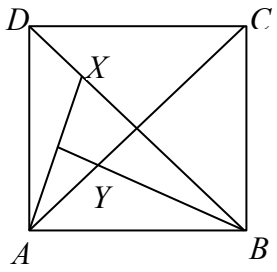
(c) Work out the height of the pyramid

.....cm
(2)

(d) Calculate the volume of the pyramid

.....cm³
(2)

69. ABCD is a square, X is a point in the diagonal BD and the perpendicular from B to AX meets AC in Y.



Prove that triangles AXD and AYB are congruent.

(4)

70. In a box

the number of blue counters and the number green counters are in the ratio 7:4
the number of green counters and the number of red counters are in the ratio 3:1

The total number of counters in the bag is 444.

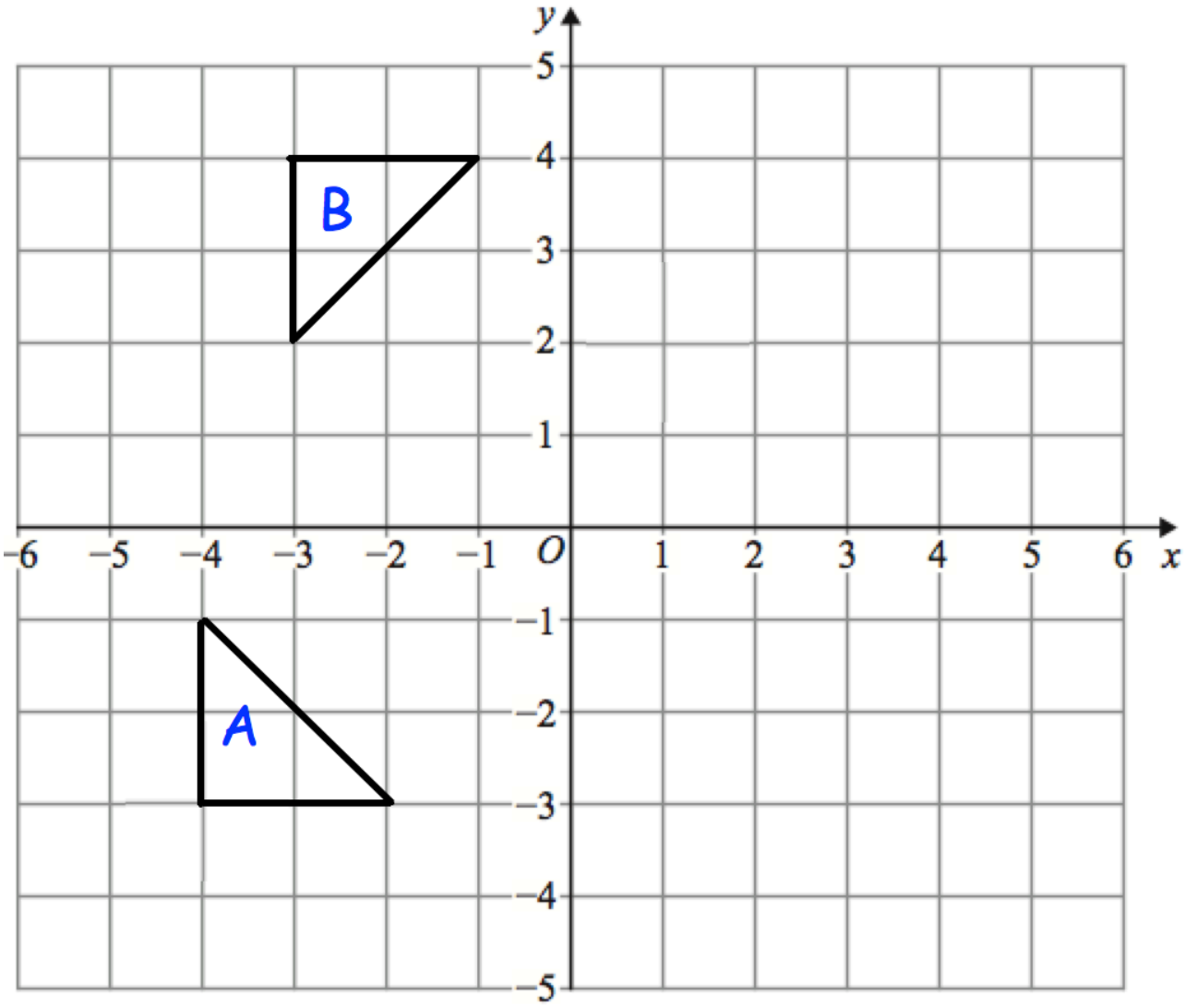
How many green counters are in the bag?

71. Write $\frac{1}{8}$ in the form 2^n

.....

(2)

72.



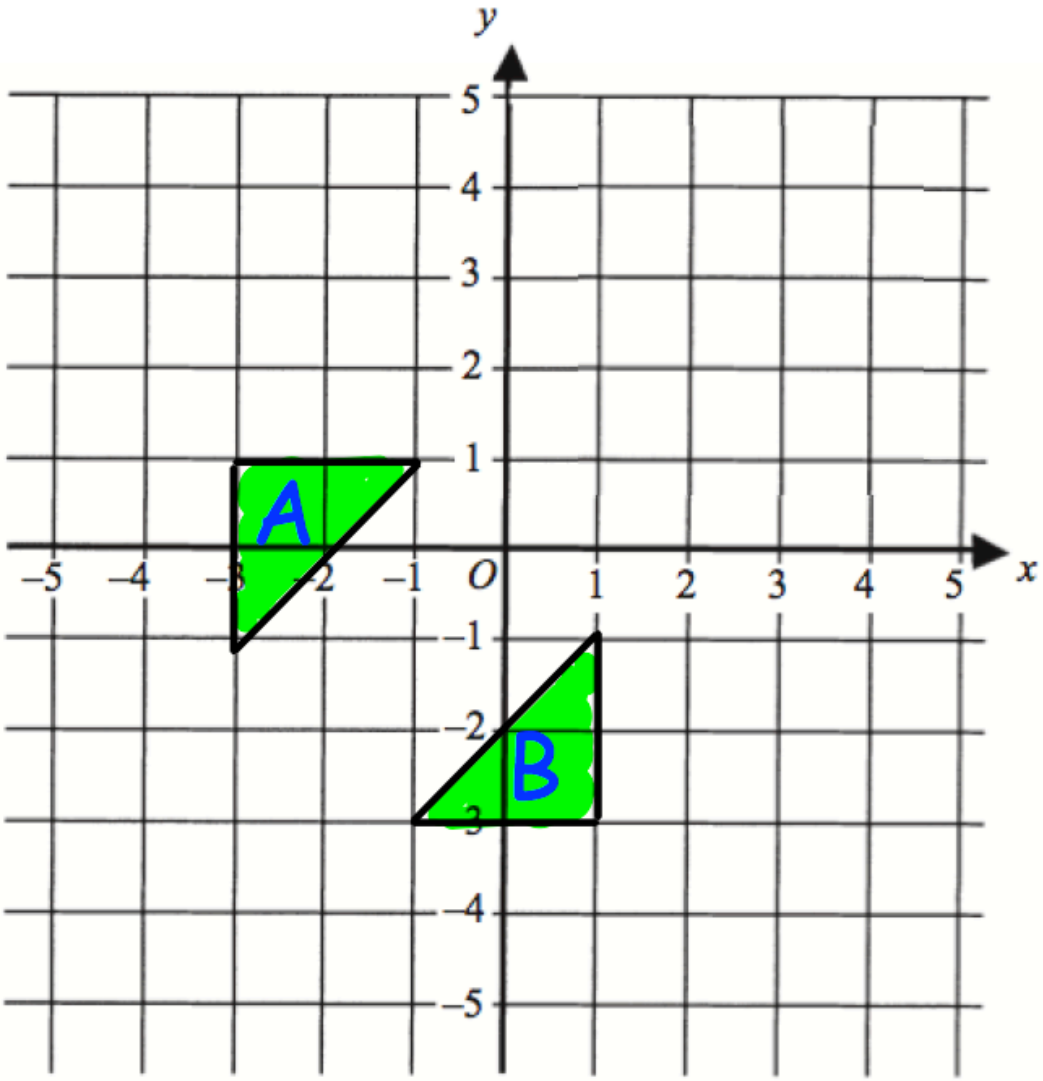
Describe fully the single transformation that maps triangle A onto triangle B.

.....

.....

(2)

73.



Describe fully the single transformation that maps triangle A onto triangle B.

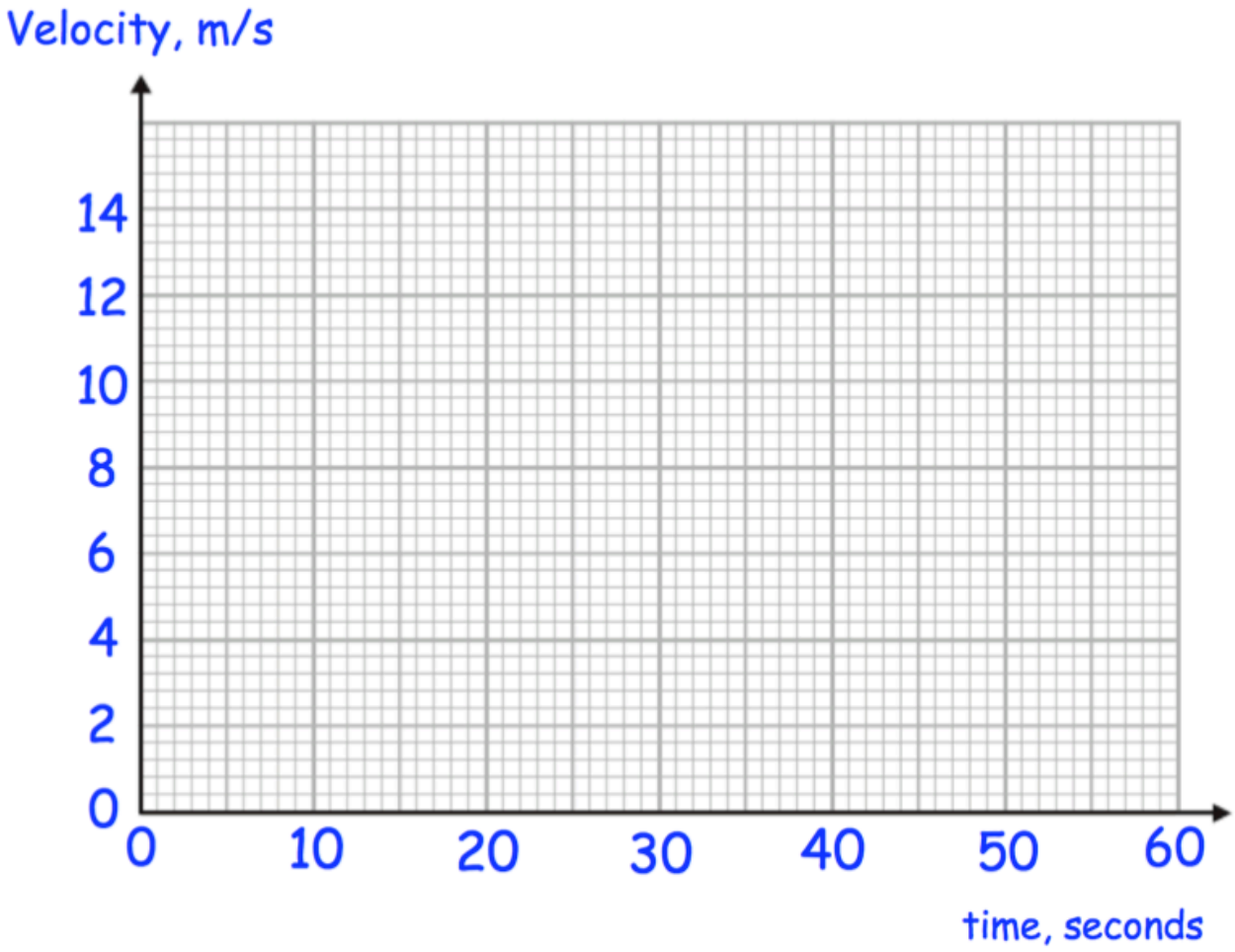
.....

.....

(2)

74. A remote control car drives in a straight line.
It starts from rest and travels with constant acceleration for 20 seconds reaching a velocity of 12m/s.
It then travels at a constant speed for 10 seconds.
It then slows down with constant deceleration of 2m/s^2.

(a) Draw a velocity time graph



(b) Using your velocity-time graph, work out the total distance travelled.

……..m
(2)

75. The speed limit on a road is 50 mph.

A car drives 19 miles in 22 minutes.

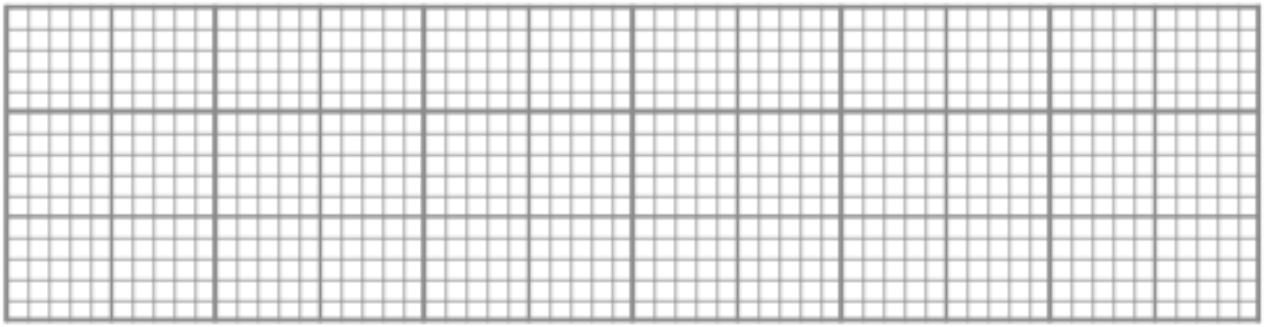
Is the car breaking the speed limit?
You must show your workings.

(3)

76. The table gives information about the weights of 50 male rugby players.

Lowest	68kg
Lower Quartile	74kg
Median	82kg
Upper Quartile	88kg
Highest	100kg

(a) Draw a box plot to show this information.

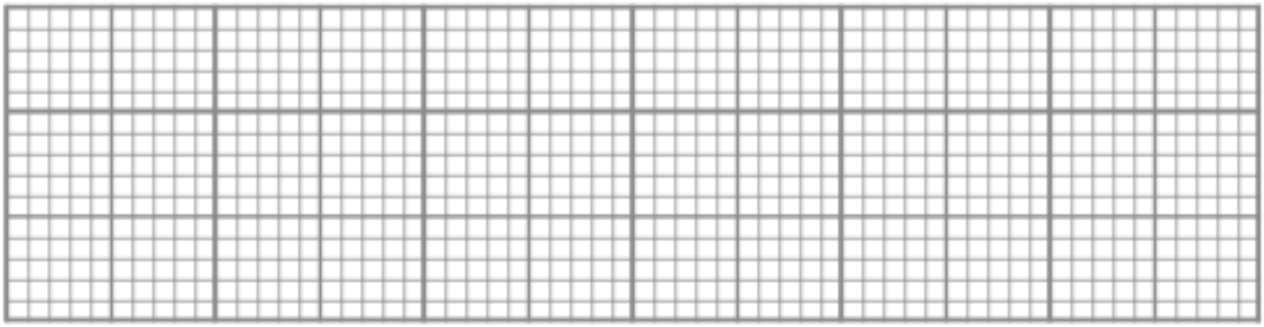


(3)

The weights of 50 female rugby players are also recorded.

The lightest female rugby player is 51kg.
The lower quartile is 60kg.
The median is 71kg.
The range and interquartile range for the female rugby players is the same as the male rugby players.

(b) Draw a box plot to show this information.



(3)

77

(a) Factorise $y^2 - 13y + 36$

.....

(2)

(b) Factorise $2w^2 - 9w + 4$

.....

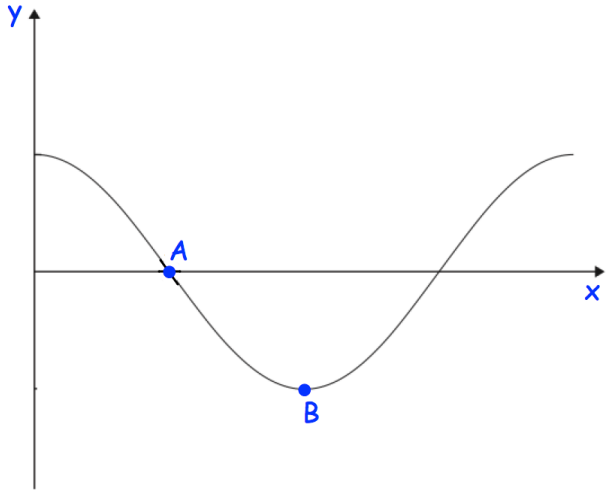
(2)

78. Solve the inequality $x^2 - 9x + 14 \leq 0$

.....

(3)

79. Here is the graph of $y = \cos x$



(a) Write down the coordinates of the point A.

(..... , ...)

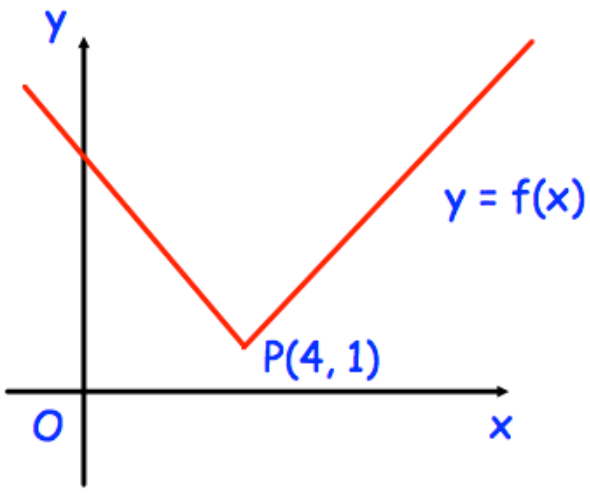
(1)

(b) Write down the coordinates of the point B.

(..... , ...)

(1)

80. Here is the graph of y = f(x)
The point P(4, 1) is a point on the graph.



What are the coordinates of the new position of P when the graph y = f(x) is transformed to the graph of

(a) y = –f(x)

(..... , ...)
(1)

(b) y = f(x) + 4

(..... , ...)
(1)

(c) y = f(–x)

(..... , ...)
(1)

(d) y = f(x + 5)

(..... , ...)
(1)

81 (a) Rationalise the denominator of

$$\frac{12}{\sqrt{3}}$$

.....

(2)

(b) Evaluate $\sqrt{2} \times \sqrt{32}$

.....

(2)

(c) Expand and simplify $(\sqrt{3} + \sqrt{5})^2$

.....

(2)

(d) Evaluate $(5 + \sqrt{2})(5 - \sqrt{2})$

.....

(2)

82. The time taken, t, for passengers to be checked-in for a flight is inversely proportional to the square of the number of staff, s, working.

It takes 30 minutes passengers to be checked-in when 10 staff are working.

(a) Find an equation connecting t and s.

.....

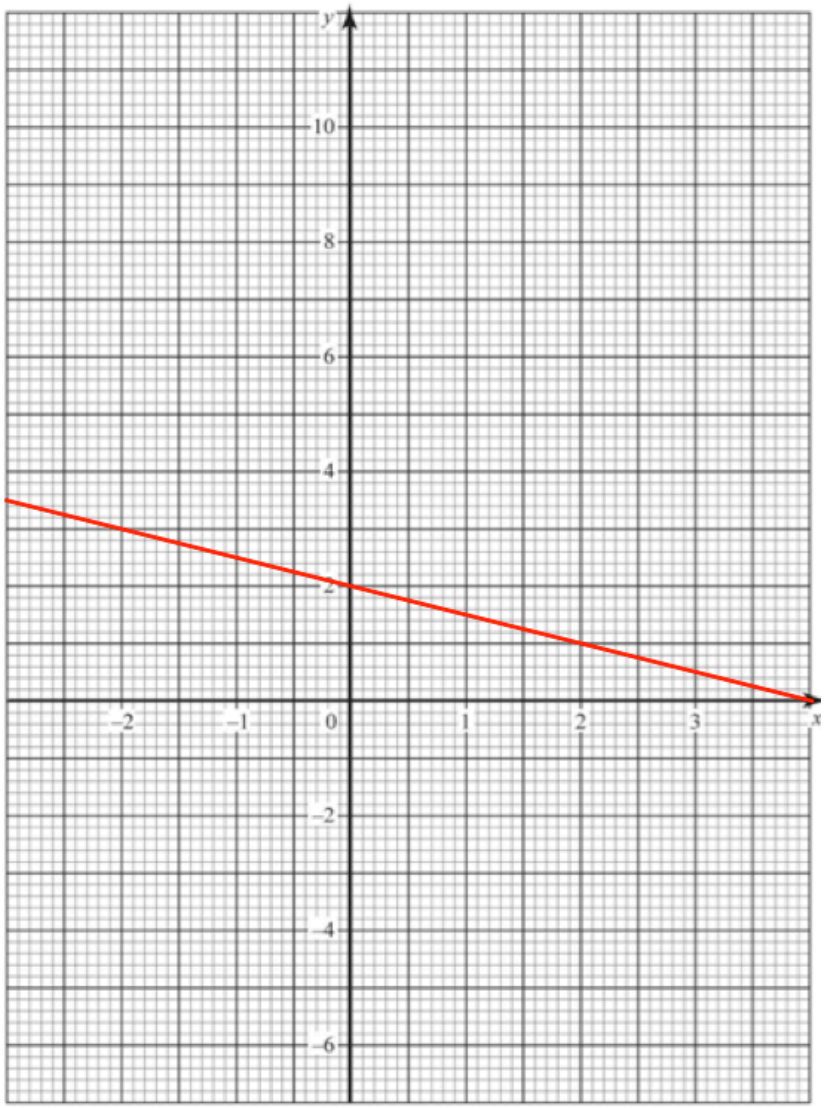
(3)

(b) What is the minimum number of staff that must be working so that the time taken is under 60 minutes?

.....

(3)

83.



The straight line L has equation $y = -\frac{1}{2}x + 2$

(a) Write down the equation of a line parallel to L

.....

(1)

(b) Find an equation of the line that goes through the point (1, 6) and is perpendicular to L

.....

(3)

84. Prove $(2n + 9)^2 - (2n + 5)^2$ is always a multiple of 4

(4)

85. Martina has some coins.

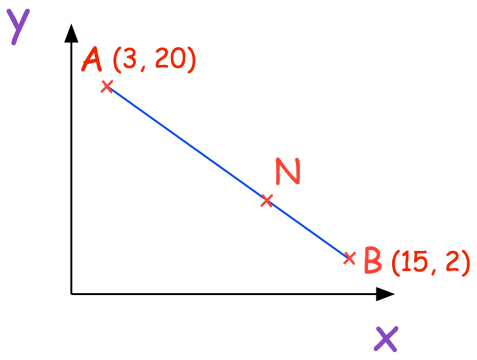
Martina has to pay 60p for a car park ticket.
She selects 3 coins at random, without replacement, from her pocket.

Work out the probability that she has chosen the exact price of the ticket.

.....

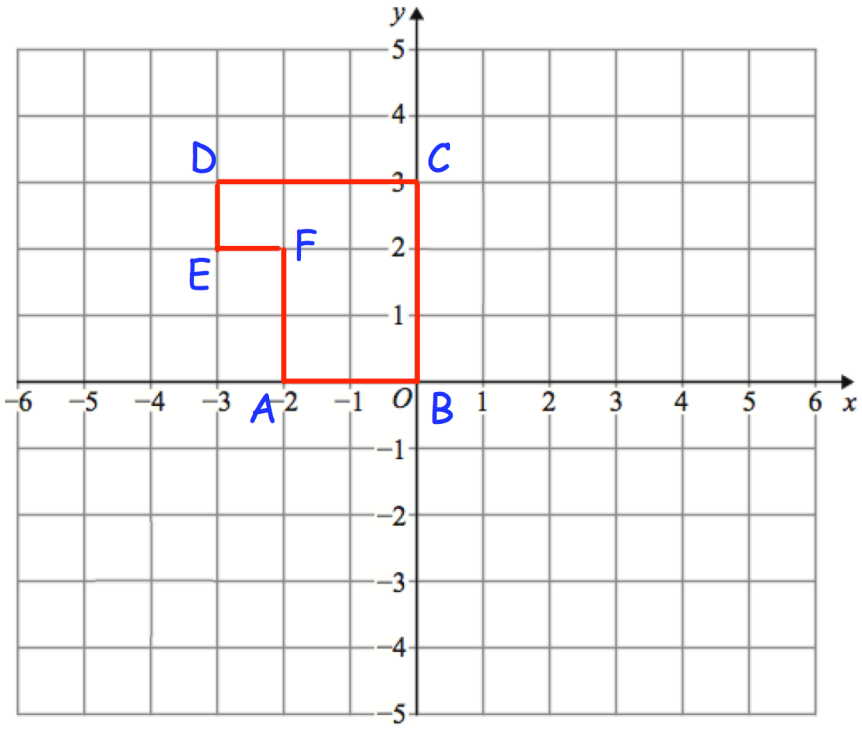
(4)

86. A is the point with coordinates (3, 20)
B is the point with coordinates (15, 2)
N is a point of the line AB such that AN : NB = 2 : 1



Find the coordinates of the point N.

87. Here is shape ABCDEF



Describe fully a **single** transformation so that only vertex F is invariant.

……

……

……