Paper 2 and Paper 3 Preparation Paper

AQA Foundation

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.
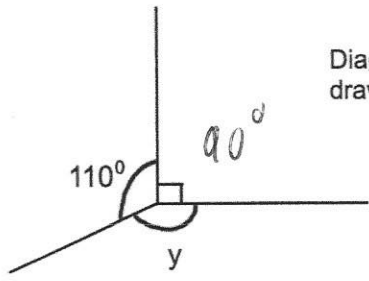3. Always show your workings

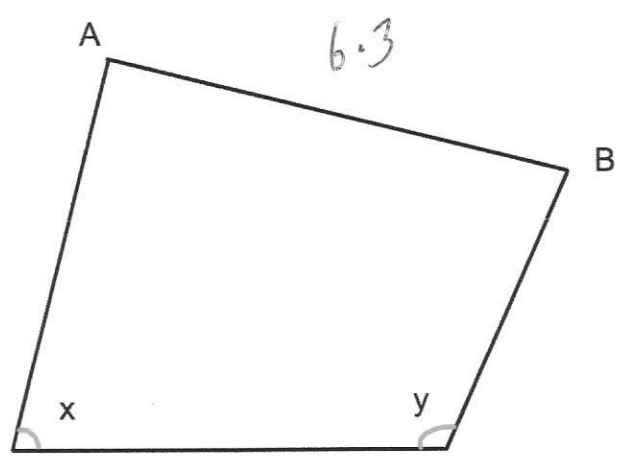# Paper 2 and 3 Checklist

1

Diagram not drawn accurately

110^0 90^0

Work out the size of the angle marked y.

$110 + 90 = 200$
$360 - 200$

160 °

2

A   6.3

B
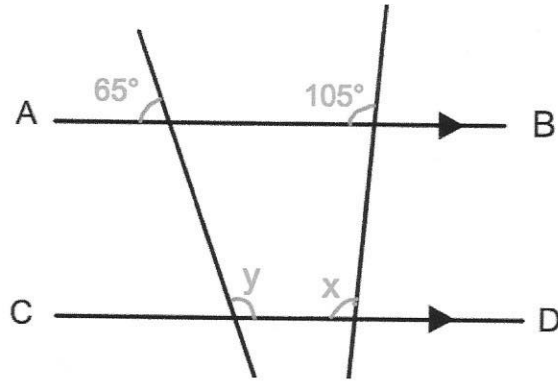
x   y

(a) Measure the length of the line AB.

6.3 .cm
(1)

(b) What type of angle is x?

acute
(1)

(c) Measure the size of angle y.

115 °
(1)

3

AB is parallel to CD.

(a) Work out the size of the angle marked x.

105 °

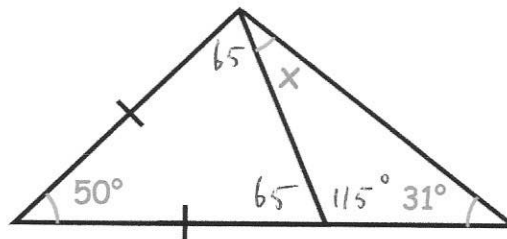Give a reason for your answer.

Corresponding angles are equal

(2)

(b) Work out the size of the angle marked y.

115 °

(2)

4

Find the size of the angle marked x.

$180 - 50 = 130$
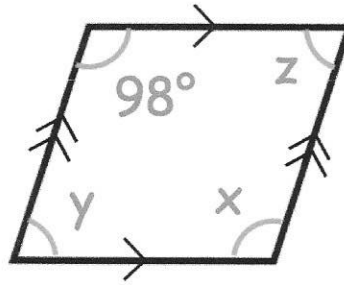
$130 \div 2 = 65°$

$180 - 65 = 115$

$115 + 31 = 146°$

$180 - 146 = 34$

34 °

(4)

5 Shown below is a parallelogram.

(a) Find x

98 °

(1)

(b) Find y

82 °

(1)

(c) Find z

82 °

(1)

6 Shown is a regular hexagon and a regular octagon.

$720 \div 6 = 120°$

120   135

y
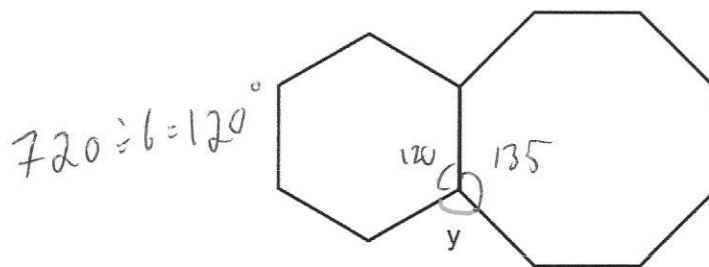
$1080 \div 8 = 135$

Calculate the size of angle y.

$120 + 135 = 255$

$360 - 135 = 105$

y = 105 °

(3)

7

This is a map of an island.

Leek ⊗ 132°

N

Castletown x

Bilton x

14·3cm

Foxville x

x
Donhampton

Scale 1cm = 10 miles
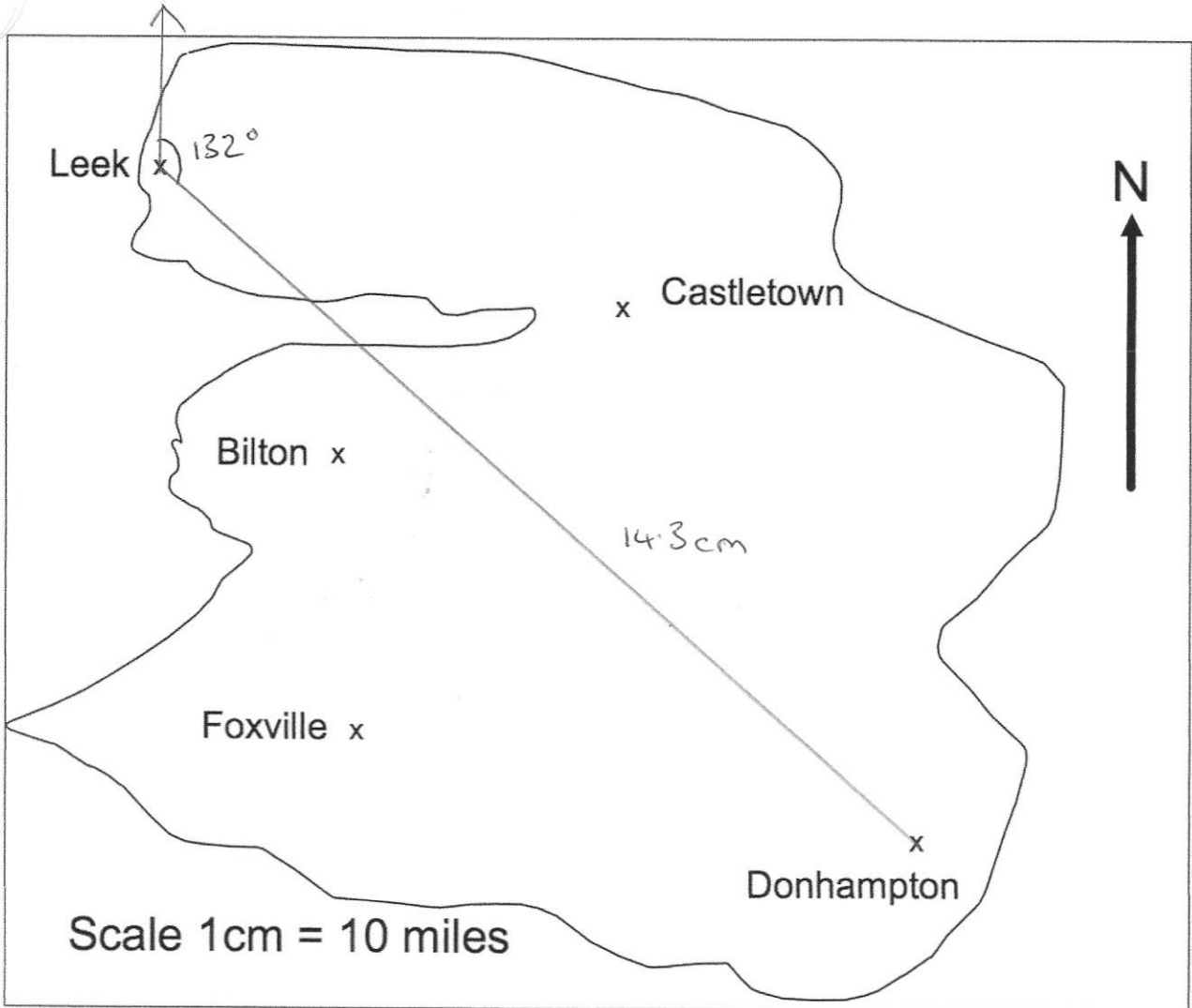
A helicopter flies in a straight line from Leek to Donhampton.

(a) How far does the helicopter fly?   * depends on printing size

14·3 ×10

...............143...............miles

(2)

(b) Write down the bearing of Donhampton from Leek.

...............132...............°

(1)

8. The perimeter of a parallelogram is 17cm.
The length of each long side is 5cm.
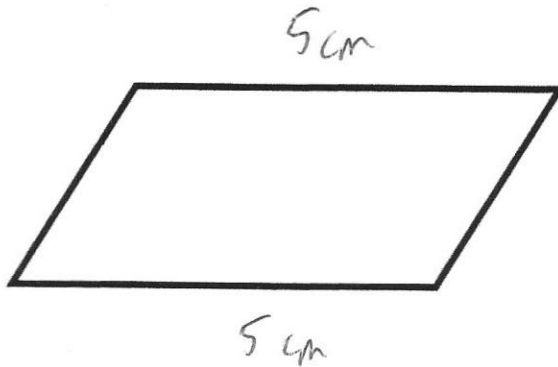
5cm

5 cm

Work out the length of each short side.

$5 + 5 = 10$

$17 - 10 = 7$

$7 \div 2 = 3.5$

3.5

..............................cm

(2)

9. Jessica wants to lay artificial grass in her rectangular garden.

16m

12m
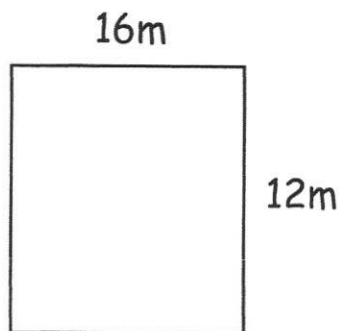
Each square metre of artificial grass costs £23

How much should Jessica pay for the artificial grass?

$16 \times 12 = 192$

$192 \times 23 = 4416$

£ 4416

(3)

10.
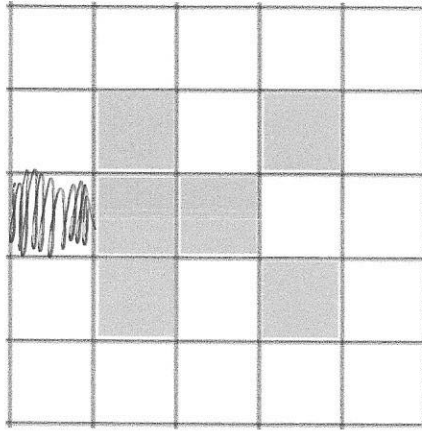
Shade one more square to make a pattern with 1 line of symmetry.

(1)

11.
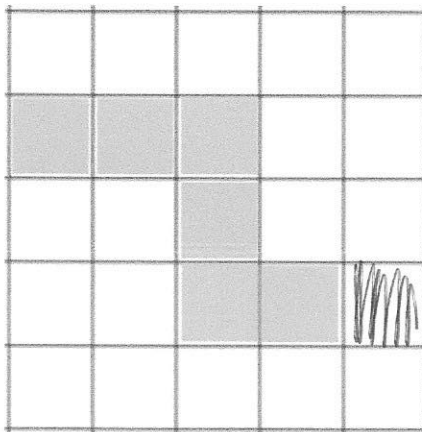
Shade one more square to make a pattern with rotational symmetry order 2.

(1)

12 Use ruler and compasses to construct the perpendicular bisector of AB.
You **must** show clearly all your construction arcs.

A

B
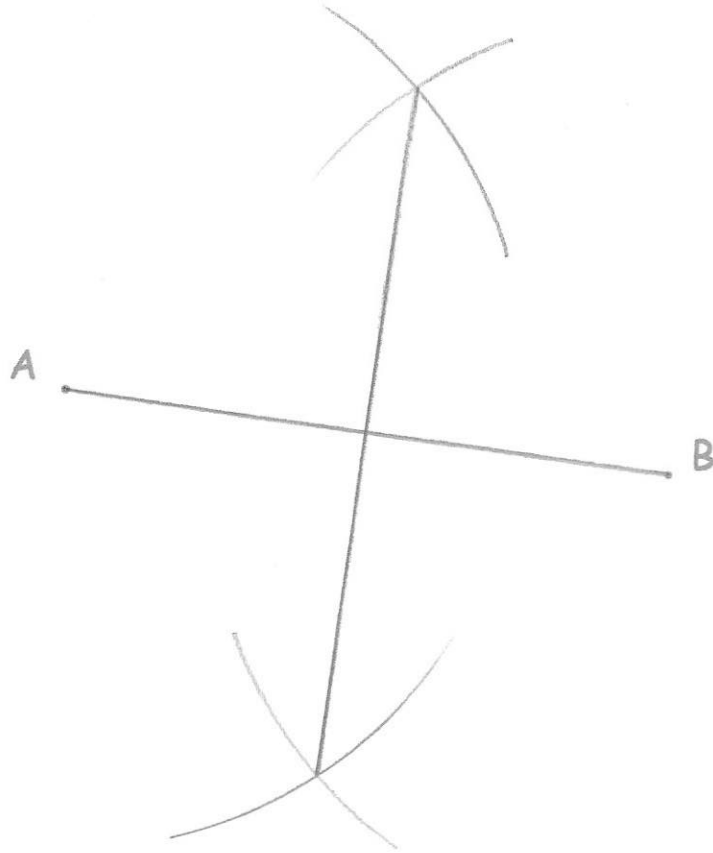
(2)

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.

1cm = 1 mile

B

A

Land

Sea
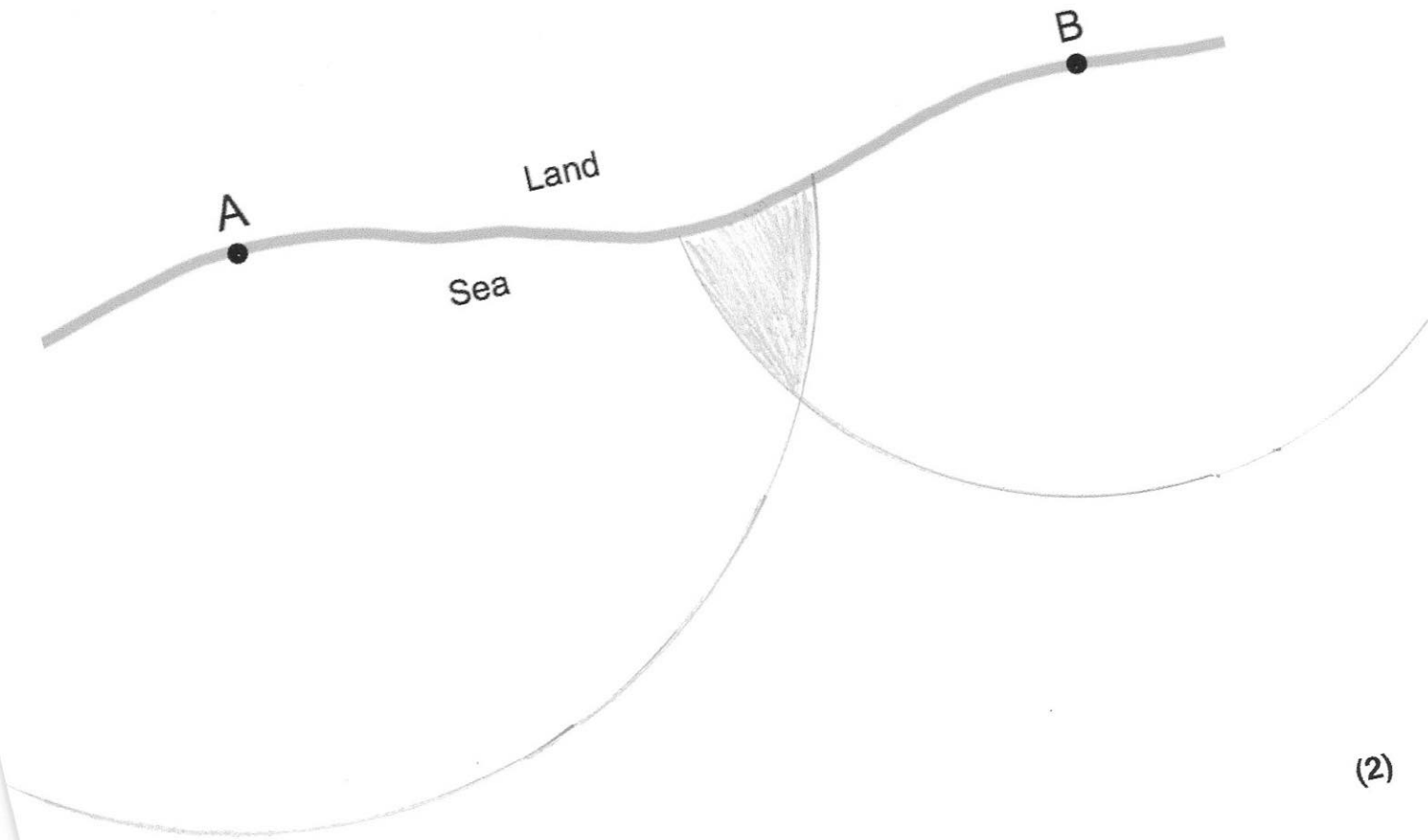
(2)

14. Below is a solid.
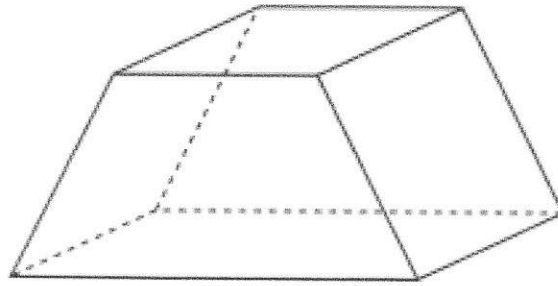
(a) Write down the number of faces

_6_
(1)

(b) Write down the number of vertices

_8_
(1)

15. Connor's watch is 17 minutes slow
Joseph's watch is 5 minutes fast

The time on Joseph's watch is 19:01

What time is shown on Connor's watch?

18:56 (actual time)

18:39

18:39
(1)

16.   Here is part of a timetable for a bus.

Southville	09 18	10 38	12 05
Leek	09 28	10 48	-------
Milton	09 41	11 01	-------
Newtown	09 49	11 09	-------
Red Island	09 55	11 15	12 36
Sandville	10 13	11 33	-------
Bakerstown	10 31	11 51	13 00

A bus leaves Southville at 10 38

(a) At what time should the bus arrive at Newtown?

.......11:09........
(1)

(b) How long will the journey take?

......31......minutes
(1)

James arrives at the Milton bus stop at 09 29.
He waits for the next bus to Red Island.

(c) (i) How many minutes should he wait?

......12......minutes
(1)

(ii) At what time should James arrive at Red Island?

......09:55......
(1)

Sally wants to travel from Southville to Bakerstown.
The 12 05 is an 'express' bus.

(d) How many minutes shorter is the journey if she takes the 'express bus?'

......18......minutes
(2)

17. The distance from Leek to Milton is 310 miles.
A train travels this distance in 4 hours 15 minutes.

Calculate the average speed of the train.

$$\frac{310}{4.25} = 72.9411...$$

72.94

...........................mph

(3)

18. Bethany drove to a family meal and then back home.
The meal was at a restaurant that is 70 kilometres from her home.

Bethany left home at 10:00 and arrived at the restaurant at 11:30.
She stayed at the family meal for 2 hours.
Bethany then drove home at a speed of 35 kilometres per hour.

Show this information on the distance-time graph.

Distance from home (kilometres)

Time
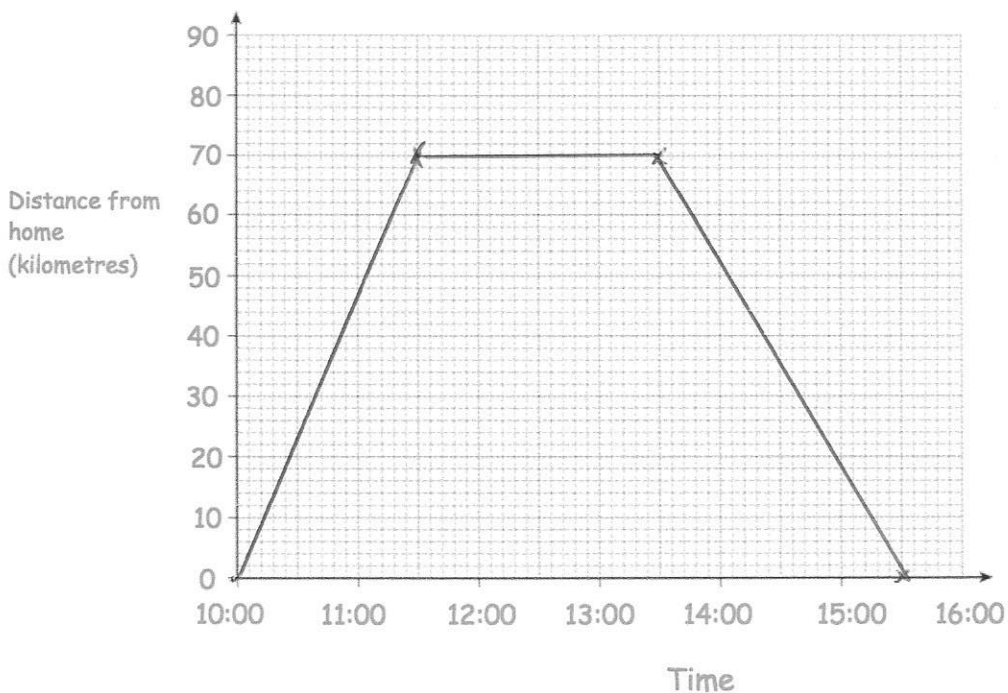
(3)

19. Iron has a density of 7.8g/cm³.
A solid iron statue has a mass of 877.5g.
Work out the volume of the statue.

$$v = \frac{m}{d}$$

$$\frac{877.5}{7.8}$$

112.5
.... cm³

(2)

20.

7cm
a

10cm
b

c
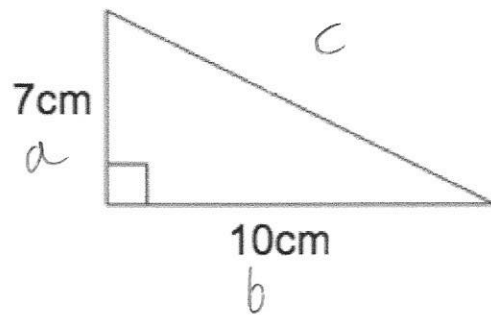
Shown is a right-angled triangle.

Work out the perimeter of the triangle

$$a^2 + b^2 = c^2$$

$$7^2 + 10^2 = c^2$$

$$49 + 100 = c^2$$

$$c^2 = 149$$

$$c = 12.20655...$$

$7 + 10 + 12.206...$

29.2
.... cm

(4)

21. Triangle ABC has a right angle.
Angle BAC is 25°
AC = 12.5cm

C   Not to scale

12.5cm

25°

A   B
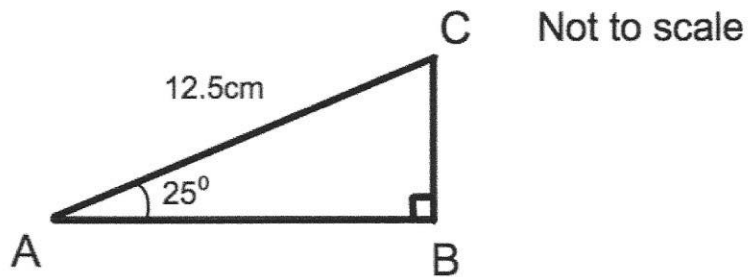
Calculate the length of AB

$AB = Cos(25) \times 12.5$

11.33
...................cm
(3)

22. Shown below is a trapezoid prism.

6cm

5cm

8cm

12cm
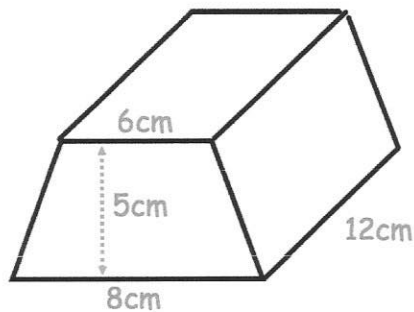
Find the volume of the prism.

$\frac{1}{2}(6+8) \times 5$

$7 \times 5 = 35$

$35 \times 12 = 480$

420
.......................cm³
(4)

23.   Write down all the prime numbers between 10 and 20.

11   13   17   19

(2)

24.   (a) Write 50 as a product of its prime factors.

2×5^2

(2)

(b) Find the Lowest Common Multiple (LCM) of 32 and 50.

$32 = 2 \times 2 \times 2 \times 2 \times 2$

$LCM = 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5$

800

(2)

25.   Work out

$$10^{-2}$$

Give your answer as a decimal.

$\frac{1}{10^2}$

$\frac{1}{100}$

0.01

(2)

26. Mr Holland has 2500kg of rice.
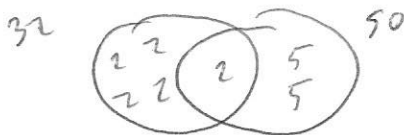
   (a) Write 2500 kg in grams.
       Give your answer in standard form.

       2500000

       2.5×10^{6}

       ....g
       (2)

   (b) One grain of rice weighs 0.03g
       Write the weight of one grain of rice in standard form.

       3×10^{-2}

       ....g
       (1)

   (c) How many grains of rice are there in 2500kg of rice?
       Give your answer in standard form.

       $\left(2.5 \times 10^{6}\right) \div \left(3 \times 10^{-2}\right)$

       $8.\dot{3} \times 10^{7}$

       ....
       (2)

27. Complete the table.

Fraction	Decimal	Percentage
$\dfrac{17}{20}$	0.85	85%
$\dfrac{3}{25}$	0.12	12%
$\dfrac{23}{25}$	0.92	92%

(4)

28 Sarah bought a TV for £250
Three years later she sold it for £180

Work out the percentage loss

$$\frac{70}{250} \times 100$$

............28.............%

(3)

---

29 Nina invested £1500 for 4 years at 2.5% per annum simple interest.

Work out the total amount of money in the account at the end of 4 years.

$1500 \div 100 = 15$

$15 \times 2.5 = £37.50$

$37.50 \times 4 = 150$

$1500 + 150$

£........1650.........

(3)

---

30 Fiona leaves £1600 in the bank for four years.
It earns compound interest of 4% each year.

Calculate the total amount Fiona has in the bank at the end of the four years.

$1600 \times 1.04^4 = 1871.773 - -$

£.......1871.77.......

(3)

31. Lauren is given a 12% pay rise.
Her new salary is £24,080

What was Lauren's salary before the pay rise?

$$112\% \rightarrow 24080$$
$$1\% \rightarrow 215$$
$$100\% \rightarrow 21500$$

£ 21500

(3)

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32. Chris and Molly win money in a competition.
They share the money in the ratio 2 : 3
Molly receives £240.

(a) How much money does Chris receive?

$$240 \div 3 = 80$$
$$80 \times 2 = 160$$

£ 160

(2)

(b) How much money did they win in the competition?

$$240 + 160$$

£ 400

(1)

33. Sophie went to Spain.
    She changed £225 into euros (€).

    The exchange rate was £1 = €1.62

    (a) Change £225 into euros (€).

    225×1.62

    € 364.50

    (2)

    On her return to England, Sophie changed €66 into pounds (£)

    The new exchange rate was £1 = €1.50

    (b) Change €66 into pounds (£).

    $66 \div 1.5$

    £ 44

    (2)

34. Thomas has a recipe for making Rice Krispie cakes.
    The recipe uses 120g of chocolate and 80g of Rice Krispies to make 12 cakes.

    (a) How much chocolate should Thomas use to make 30 cakes?

    $120 \div 12 = 10g$ per cake

    30×10

    300 g

    (2)

    (b) What is 120g out of 200g expressed as a percentage?

    $$\frac{120}{200} = \frac{60}{100}$$

    60 %

    (1)

35. A number, n, is rounded to 1 decimal place.
    The result is 1.3
    Using inequalities, write down the error interval for n.

$$1.25 \leq n < 1.35$$

(2)

36. Florence buys a car for £17100

   She pays a deposit of £6750 and pays the rest in equal monthly payments.
   Each monthly payment is £230

   How many monthly payments does Florence make?

   $17100 - 6750 = 10350$
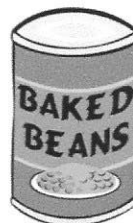
   $10350 \div 230 = 45$

   45

(3)

37. 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.

$215g = 40p$

$1g = 0.186p$

$395g = 74p$

$1g = 0.187 g$

The 215g tin is better value

(4)

38. The number of months, m, to complete a piece of research is found by $m = \dfrac{600}{n}$

where n is the number of scientists working on the research.

How long should the research take if 12 scientists are working on it?

$$m = \frac{600}{12}$$
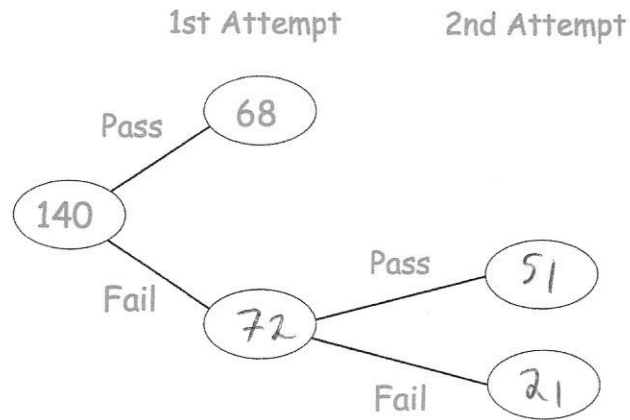
50

(2)

39. Work out

$$\sqrt[3]{100 - 2.4^3}$$

4.417014015

Give your answer to 3 significant figures.

4.42

(2)

46. 140 students sign up for a college course.
At the end of the course, each student has two attempts to pass a test.
If a student passes either attempt, they are awarded a certificate

1st Attempt   2nd Attempt

Pass   68

140

Pass   51
Fail
72

Fail   21

85% of the students receive a certificate.

Work out how many students passed the test in their 2nd attempt.

85% of 140 = 119

119 - 68 = 51

(3)

41

100 students study one language at a college.

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

54 of the students are in Year 12.
20 of the 29 students who study Spanish are in Year 13.
31 students study German.
15 Year 13 students study French.

Work out the number of Year 12 students who study German.

	Yr 12	Yr 13	Total
French	25	15	40
Spanish	9	20	29
German	20	11	31
Total	54	46	100

...................20...................

(4)

42 The pictogram shows the amount of money raised by students in some tutor groups at a school.

Key ◯ = £10

Tutor group		Raised
S	◯◯◯◯◯◯	£60
T	◯◯◯	£30
E	◌ ◌ ◌ ◌ (	£45
P	◯◯◯(	£35

(a) Complete the raised column.

(2)

(b) Complete the pictogram for tutor group E.

(2)

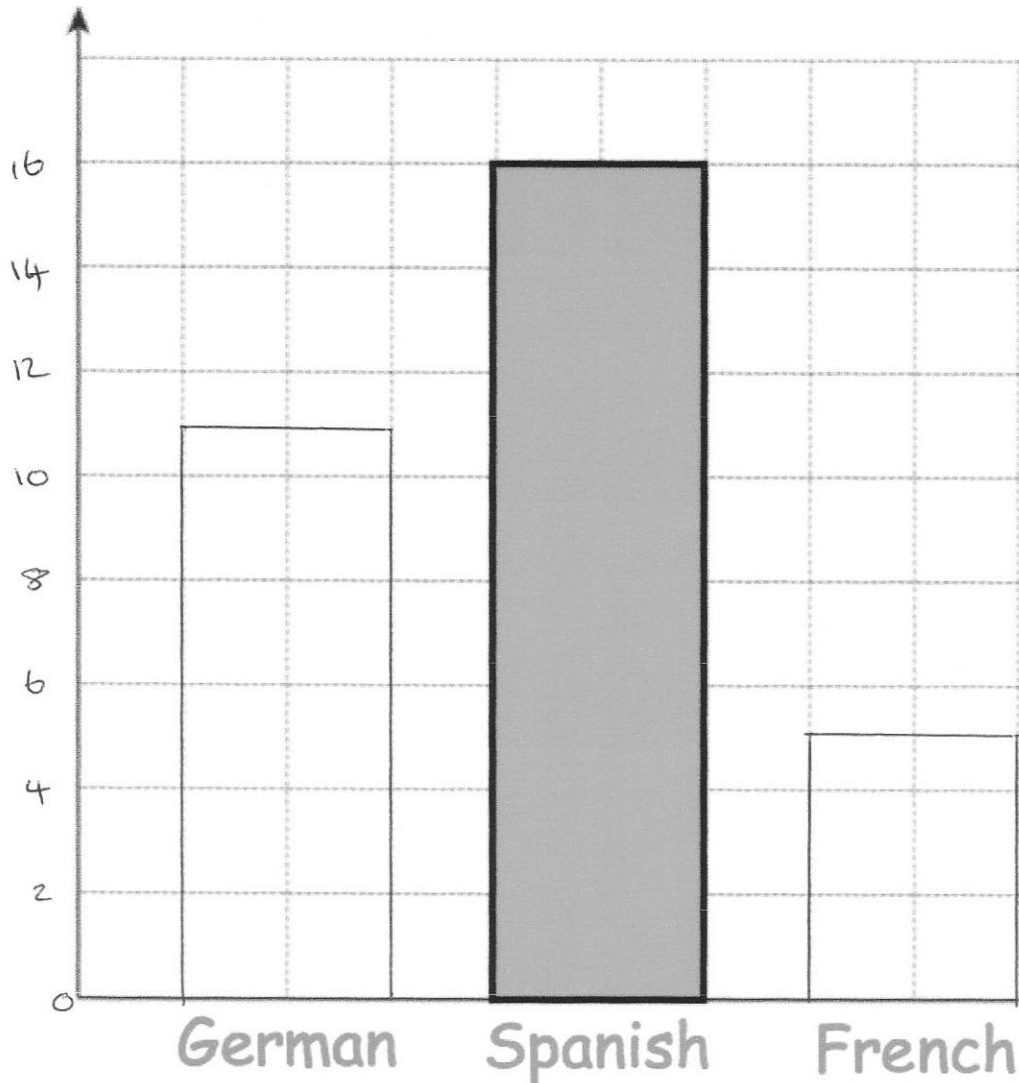(c) How much money was raised altogether?

60 + 30 + 45 + 35

£ 170

(1)

43 Miss Jackson asked the 32 students in her tutor group which language they study.

Each student studies one language only.

Half of the students in the tutor group study Spanish.
Six more students study German than French.
          11   5

Complete the bar chart.

$$32 - 16 = 16$$

$$11 + 5 = 16$$

$$11 - 5 = 6$$

(4)

44 The table gives information about students staying after school to play sport.

$360 \div 60 = 6°$

Sport	Frequency		Angle
Netball	15	× 6	90°
Hockey	10	× 6	60°
Rugby	26	× 6	156°
Football	9	× 6	54°

60

Draw an accurate pie chart to show this information.

Football

Netball

54°

156° 60°

Rugby

Hockey
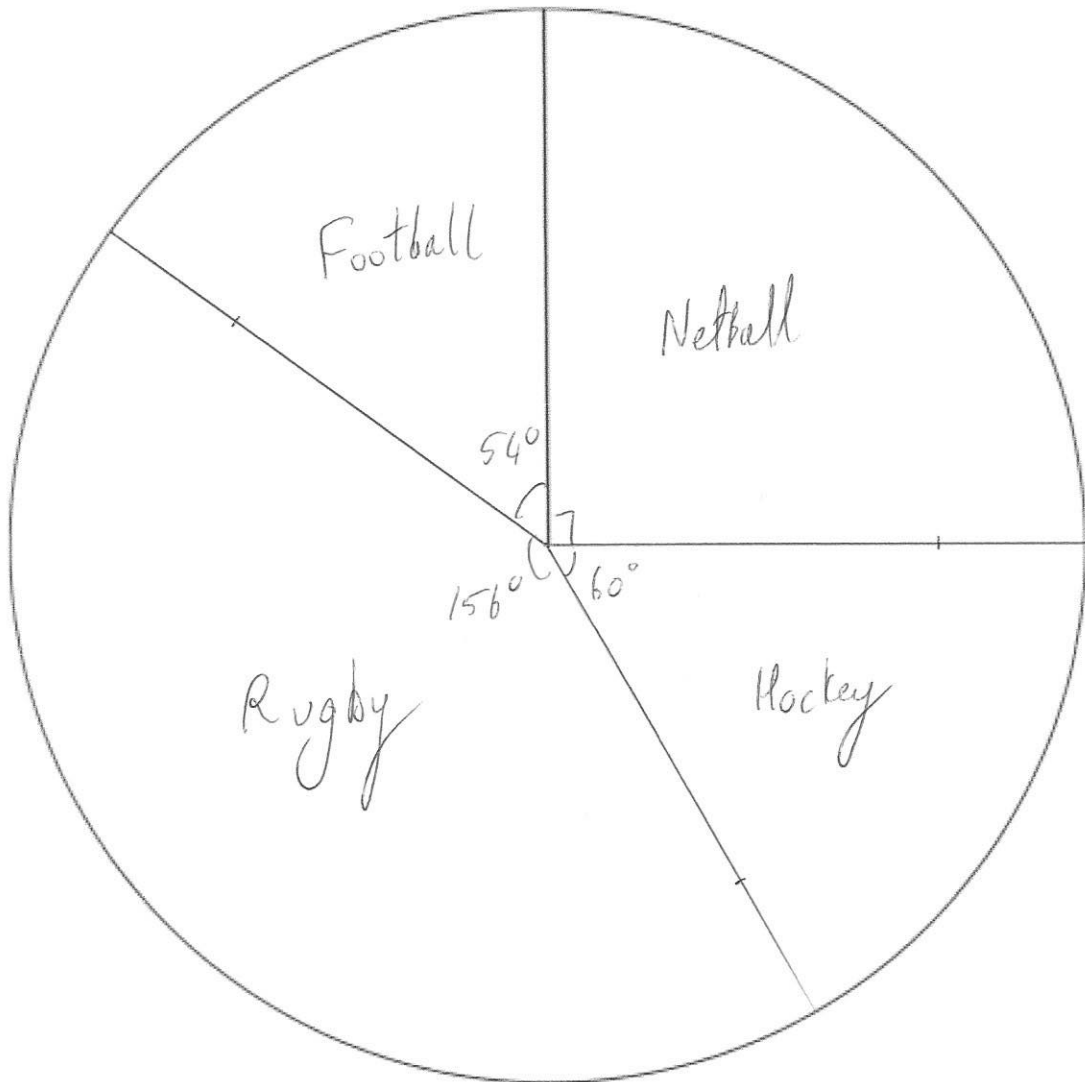
(4)

45

A rugby team can win, draw or lose a match.
The table shows the probabilities of each result.

Result	Win	Draw	Lose
Probability	0.4	0.35	

(a) Calculate the missing probability in the table.

$$0.4 + 0.35 = 0.75$$

$$1 - 0.75 = 0.25$$

.......0·25.......

(2)

Each win is worth 2 points.
Each draw is worth 1 point.
Each loss is worth 0 points.
The rugby team plays 20 games in a season.

(b) Work out how many points the rugby team should receive in one season.

$$20 \times 0.4 = 8 \text{ wins}$$

$$20 \times 0.35 = 7 \text{ draws}$$

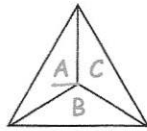$$20 \times 0.25 = 5 \text{ Losses}$$

$$8 \times 2 = 16$$
$$7 \times 1 = 7$$
$$\frac{+}{23}$$

.......23.......
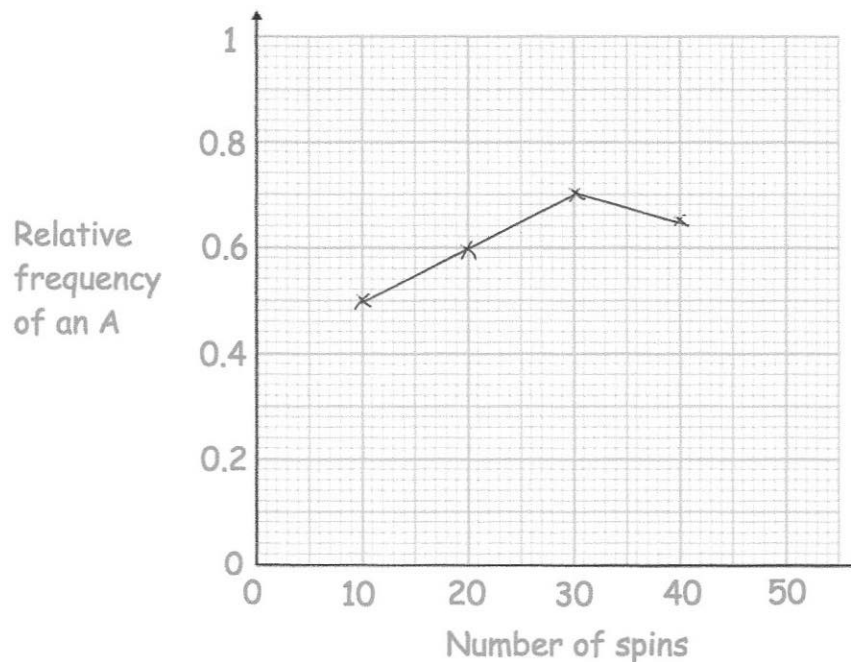
(3)

46 A three-sided spinner is labelled A, B and C.

The spinner is spun and the frequency the letter A is recorded every 10 spins.
The table below shows this information.

Spins	10	20	30	40
Frequency of an A	5	12	21	26

$\frac{5}{10} = 0.5$ $\frac{12}{20} = 0.6$ $\frac{21}{30} = 0.7$ $\frac{26}{40} = 0.65$

(a) Complete plot the relative frequencies on the graph below.

(3)

(b) Neil says the relative frequency after 50 spins is 0.8
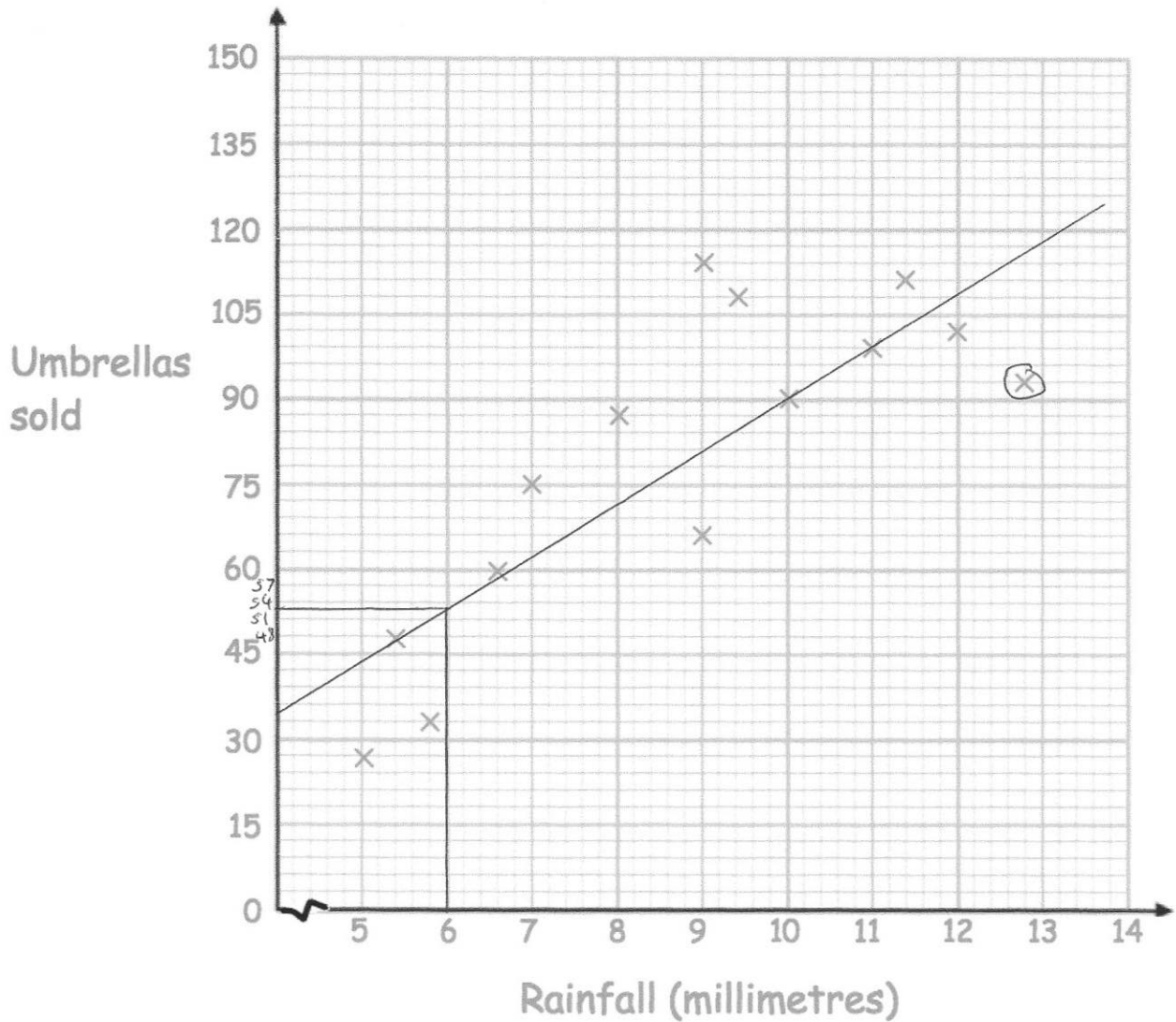Explain why Neil must be wrong

.... 50 x 0.8 = 40 , that would mean 14 more A ....

.... in 10 spins - not possible ....

(2)

47 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.

.....As the rainfall increases, so does the number.....

.....of umbrellas sold.....

(1)

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

.....12.8mm.....

(1)

In another week, there was 6mm of rain.

(c) Estimate the number of umbrellas sold.

53

(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.

It is extrapolation (beyond the range of the data).
therefore it is unreliable

(1)

48. 5 Year 10 students and 45 Year 11 students sit a test.

The mean mark for the whole group is 70
The mean mark for the Year 11 students is 72

Work out the mean mark for the Year 10 students.

$72 \times 45 = 3240$

$50 \times 70 = 3500$

$3500 - 3240 = 260$

$260 \div 5 = 52$

52

(2)

49. Timothy asked 30 people how long it takes them to get to school.

The table shows some information about his results.

Time (t minutes)	Frequency	fx
0 < t ≤ 10 5	2	10
10 < t ≤ 20 15	8	120
20 < t ≤ 30 25	12	300
30 < t ≤ 40 35	7	245
40 < t ≤ 50 45	1	45
	30	+
		720

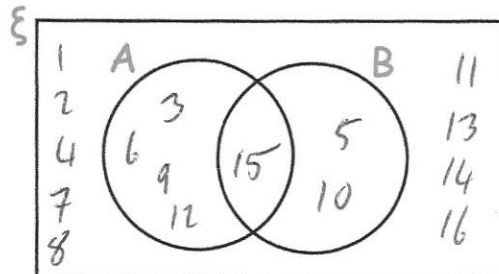Work out an estimate for the mean time taken.

$$720 \div 30 = 24$$

..........24..........minutes

(4)

50. ξ = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}

A = multiples of 3
B = multiples of 5

(a) Complete the Venn diagram

(3)

One of the numbers is selected at random.

(b) Write down P (A ∩ B)

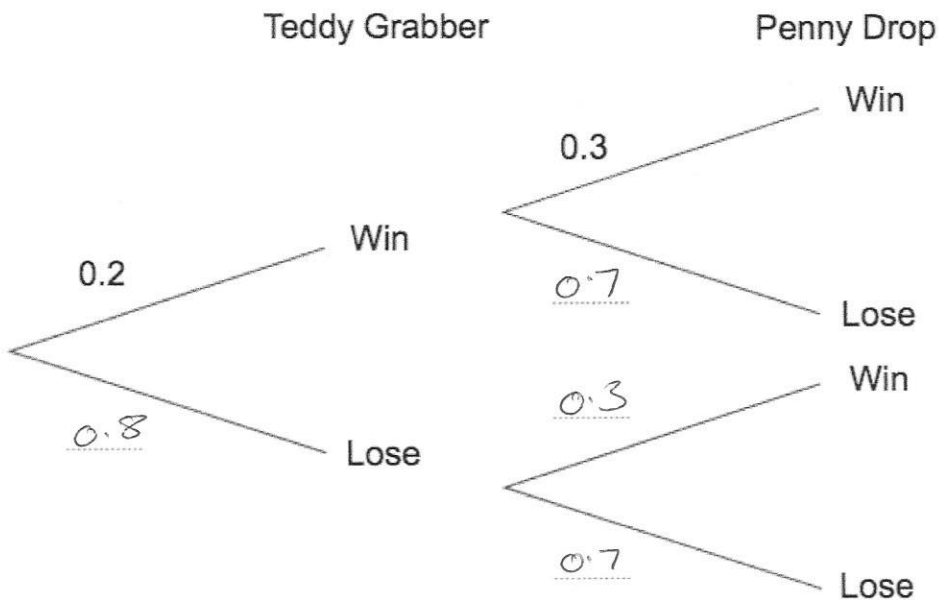$\frac{1}{16}$

(1)

51

James goes to an arcade.

He has one go on the Teddy Grabber.
He has one go on the Penny Drop.

The probability that he wins on the Teddy Grabber is 0.2.
The probability that he wins on the Penny Drop is 0.3.

(a) Complete the tree diagram.

Teddy Grabber   Penny Drop

                                                    Win
                                    0.3

                    Win
0.2   0.7
                                                    Lose

                                                    Win
                                    0.3
0.8   Lose

                                    0.7
                                                    Lose

(2)

(b) Work out the probability that James wins on the Teddy Grabber and he also wins on the Penny Drop.

0.2 × 0.3 = 0.06

.........0.06.........

(2)

52. An airplane has economy and first class seating.
There are s seats in each row in economy.
There are t seats in each row in first class.
There are 8 rows in first class and 18 rows in economy.

Write down an expression, in terms of s and t, for the number of seats on the airplane.

$18s + 8t$

(2)

53. Simplify $9h + 5k + 4h - 8k$

$13h - 3k$

(2)

54. (a) Simplify

$$m^9 \times m^2$$

m^{11}

(1)

(b) Simplify
$$\frac{m^{10}}{m^2}$$

m^8

(1)

(c) Simplify

$$(m^3)^6$$

m^{18}

(1)

55 Expand and simplify $(w - 3)(w - 8)$

$$w^2 - 8w - 3w + 24$$

$$w^2 - 11w + 24$$

(2)

56 Factorise

15y + 20

$$5(3y + 4)$$

(2)

57 (a) Factorise $x^2 + 2x - 24$

$$(x + 6)(x - 4)$$

(2)

(b) Factorise $x^2 - 25$

$$(x + 5)(x - 5)$$

(1)

58. Sarah is x years old. _12_
    Thomas is 3 years older than Sarah. _15_
    David is twice as old as Sarah. _24_
    The total of their ages is 51.

    (a) Write an expression for Thomas's age in terms of x.

    $x + 3$
    ....
    (1)

    (b) Write an expression for David's age in terms of x.

    $2x$
    ....
    (1)

    (c) Form an equation in x and solve it to work out Sarah's age.

    $$x + x + 3 + 2x = 51$$
    $$4x + 3 = 51$$
    $$4x = 48$$
    $$x = 12$$

    _12_
    ....
    (2)

59

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

x	-2	-1	0	1	2
y	4	3.5	3	2.5	2
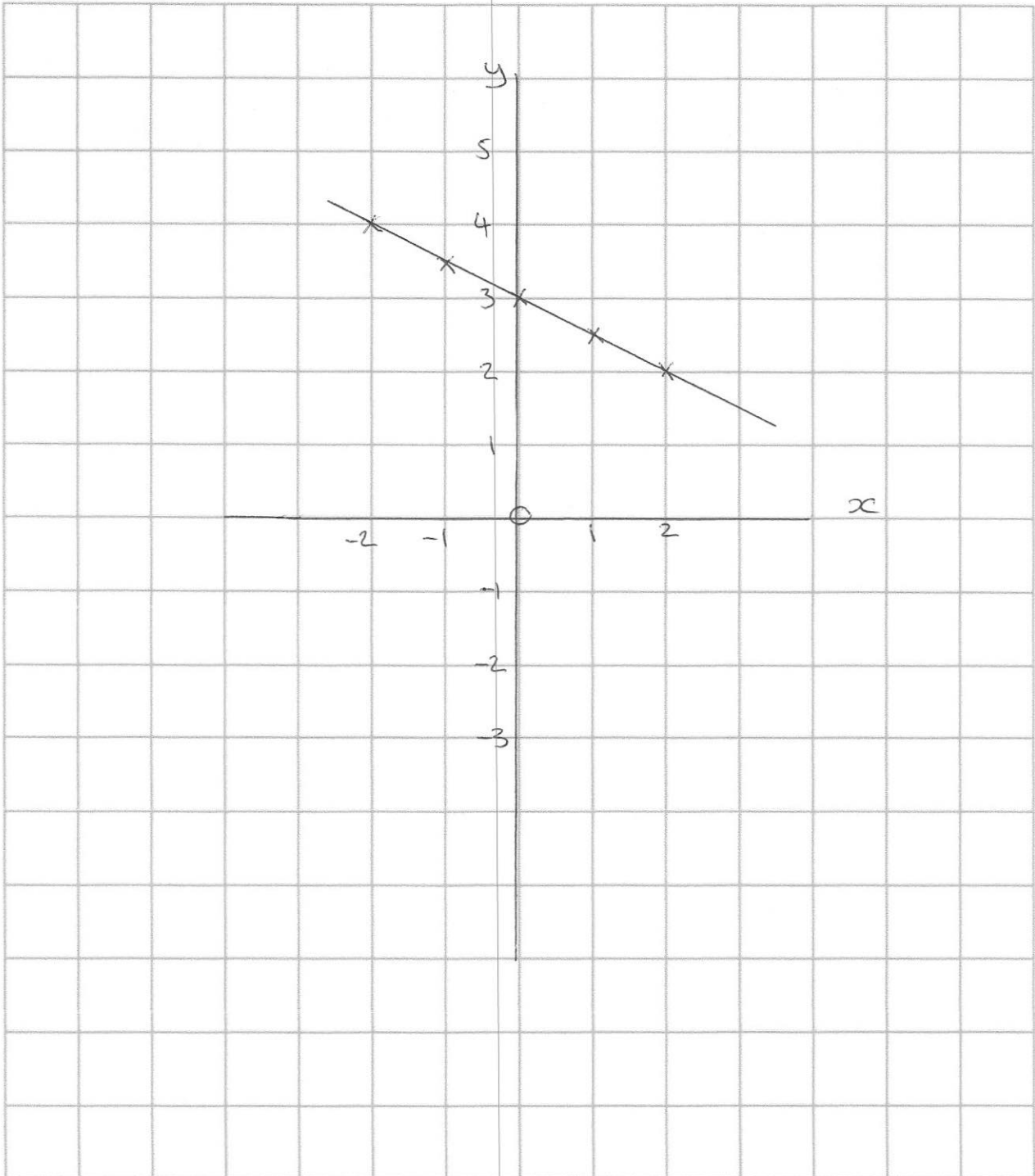
(4)

60. A straight line L is shown on the grid.
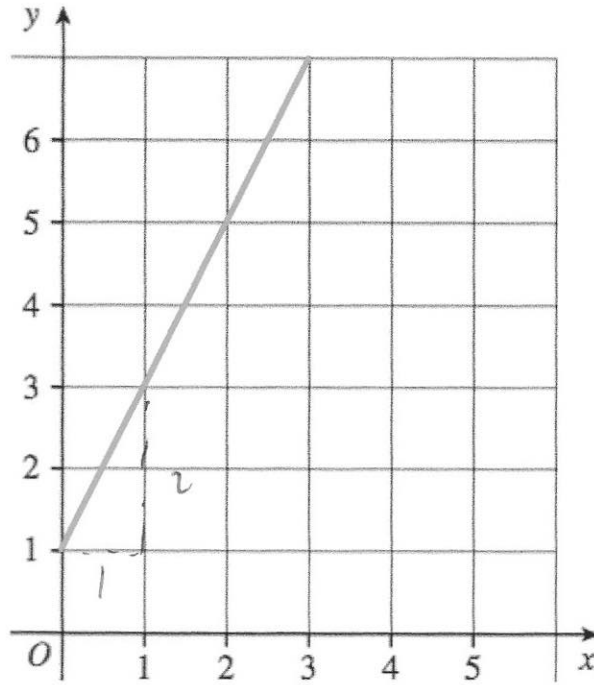
Work out the equation of line L

$y = 2x + 1$

(3)

61. A is the point with coordinates (1, 4).
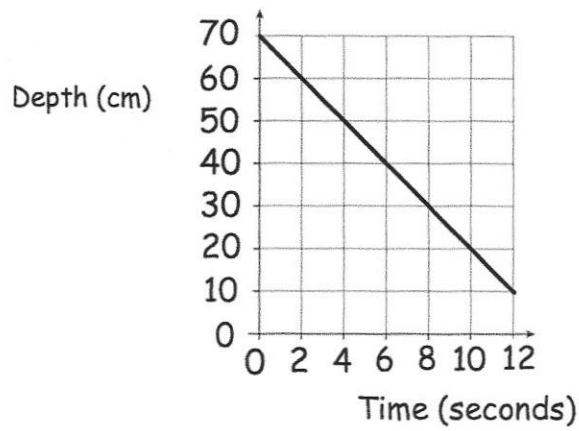B is the point with coordinates (7, 22).

Find the gradient of AB.

$(7, 22)$

18

$x \leftarrow$

$(1, 4)$ 6

$\frac{18}{6}$
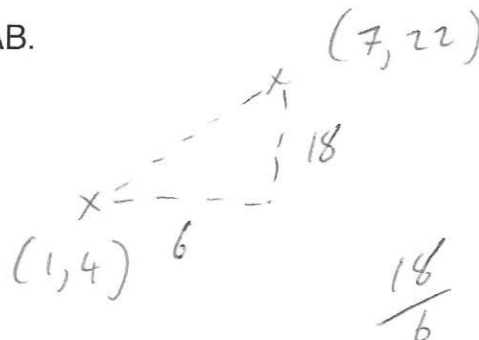
3

(2)

62. The graph below shows the depth of water in a container.

Depth (cm)

Time (seconds)

(a) Write down the gradient of the line

$$- \frac{50}{10}$$

-5

....

(1)

(b) What does the gradient of the line represent?

The change in depth of the water each second

(1)

63.
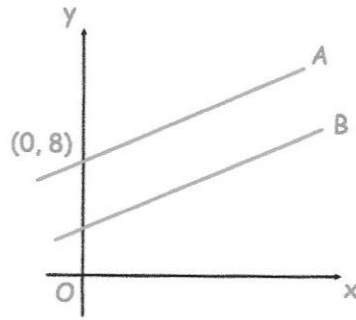
The lines A and B are parallel.

The line A passes through the point (0, 8)
The line B has equation $y = 3x + 4$

Write down the equation of line A

$y = 3x + 8$

(2)

---

64. Make w the subject of the formula

$$y = 3w - a$$

$y + a = 3w$

$\dfrac{y+a}{3} = w$

$w = \dfrac{y+a}{3}$

(2)

65. Solve the simultaneous equations

$$2x + 4y = 26$$
$$3x - y = 4$$

Do not use trial and improvement

$$2x + 4y = 26$$
$$3x - y = 4$$

$$2x + 4y = 26$$
$$12x - 4y = 16$$
$$\overline{}$$
$$14x = 42$$
$$x = 3$$

$$9 - y = 4$$
$$y = 5$$

check

$$6 + 20 = 26$$

x = ...3......... y = ...5.........

(3)

66

(a) Complete the table of values for y = x² - 3x

x	-2	-1	0	1	2	3	4
y	10	4	0	-2	-2	0	4

(2)

(b) On the grid, draw the graph of y = x² - 3x for the values of x from -2 to 4.
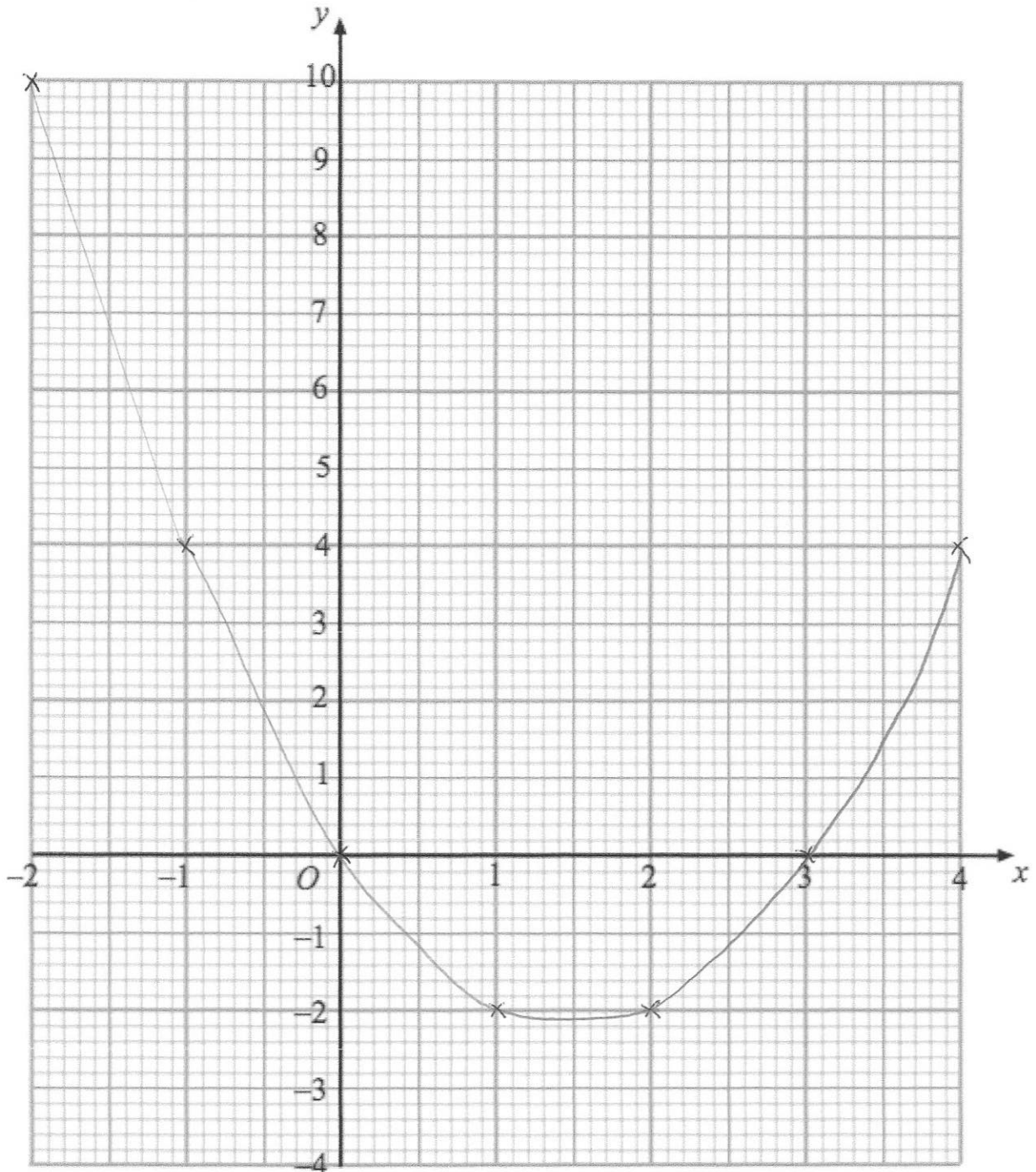
(2)

67

(a) Complete the table of value for
$$y = \frac{4}{x}$$

x	0.5	1	2	4	8	10
y	8	4	2	1	0.5	0.4

(2)

(b) On the grid, draw the graph of $y = \frac{4}{x}$ for $0.25 \leq x \leq 10$
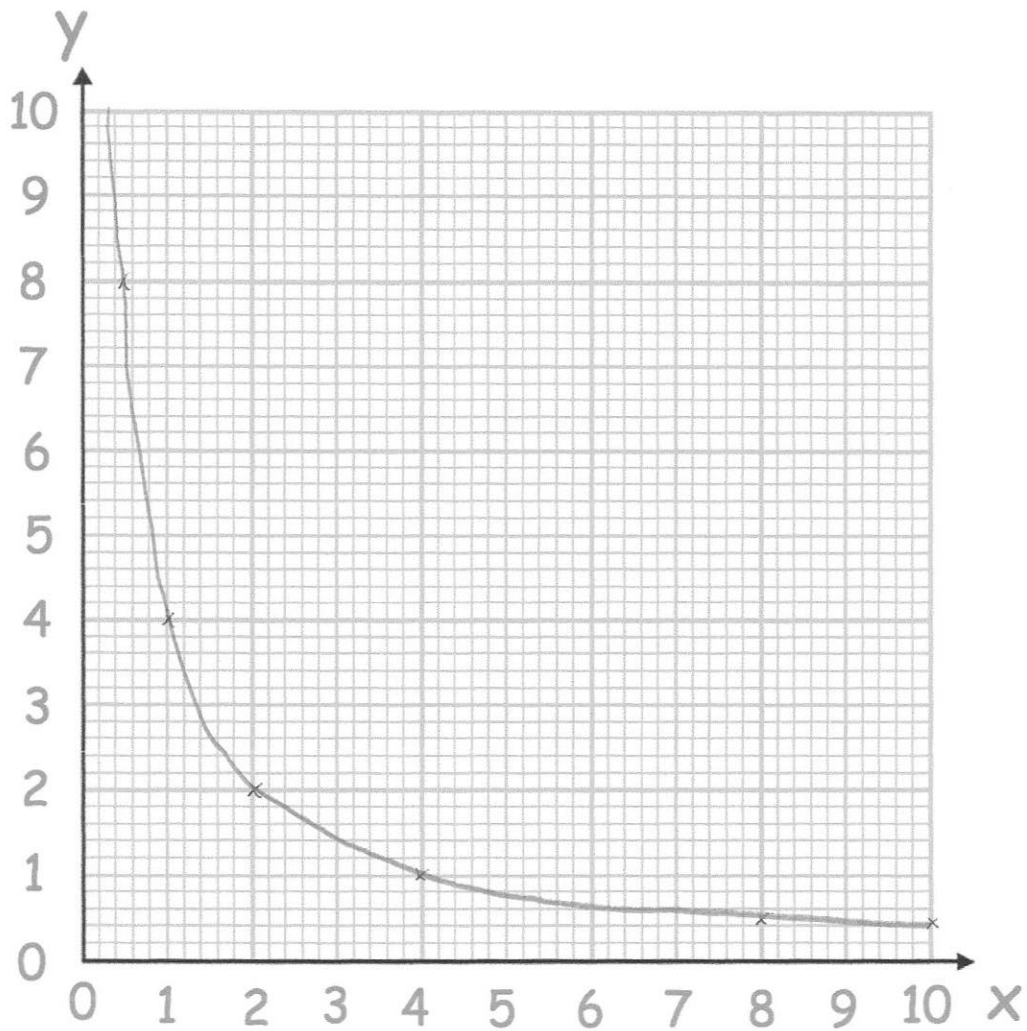
(2)

68 The diagram shows a scale drawing.

Scale: 1cm represents 100km

C

3cm

7.3cm

x
E

D
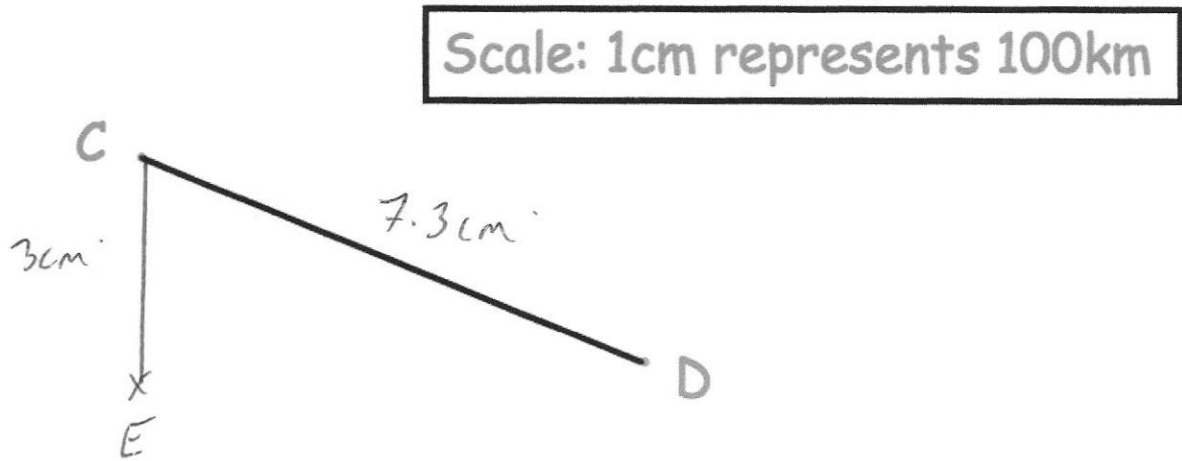
(a) Use the diagram to calculate the actual distance from C to D.

730 km

(2)

E is 300km due south of C.

(c) Show E on the diagram.

(1)

69.

5.2cm   Not drawn accurately

4.5cm   6cm

10.8cm
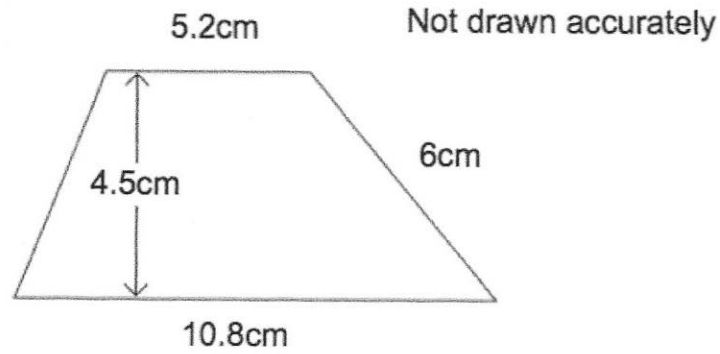
Calculate the area of the trapezium.

$$\frac{1}{2}(5 \cdot 2 + 10 \cdot 8) \times 4 \cdot 5$$

$$\frac{1}{2}(16) \times 4 \cdot 5$$

......36......cm²

(2)

70.   The mass of a 2p coin is 7g.

Find the mass of £6 worth of 2p coins.
Give your answer in kilograms.

$$600 \div 2 = 300$$

$$300 \times 7 = 2100g$$

......2.1......kilograms

(4)

71.   A glass contains water.

Below are four estimates of the amount of water in the glass.
Circle the most appropriate estimate.

25ml   25L   250ml   2.5L

(1)

72. Below are the nets of two solid shapes.
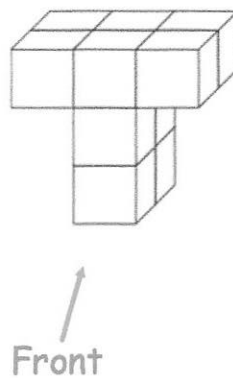

A   B
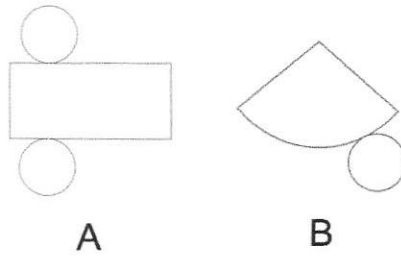
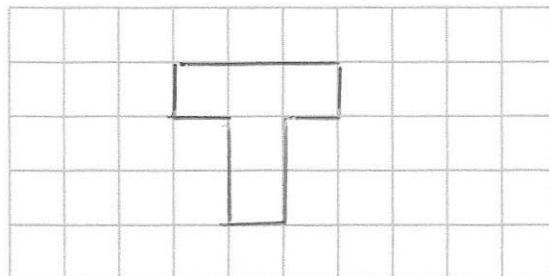(a) Write down the shape that is made from Net A.

Cylinder

(1)

(b) Write down the shape that is made from Net B.

Cone

(1)

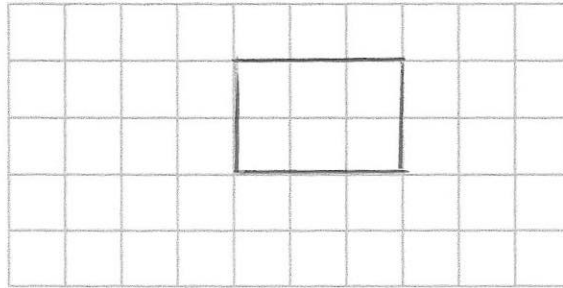73. Shown below is a solid shape made from centimetre cubes.

Front

(a) On the centimetre square grid, draw the front elevation.

(2)

(b) On the centimetre square grid, draw the plan view.

(2)

---

74. The distance chart below shows the distance, in miles, between some towns and cities.

Cambridge			
54	Ipswich		
64	45	Norwich	
43	82	78	Peterborough

(a) Write down the distance between Ipswich and Peterborough.

.........*82*........ miles

(1)

(b) Write down the distance between Norwich and Cambridge.

........*64*........ miles

(1)

(c) Write down the names of the places that are 78 miles apart

......*Norwich*...... and.. ...*Peterborough*... *Peter*

(1)

7a

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.
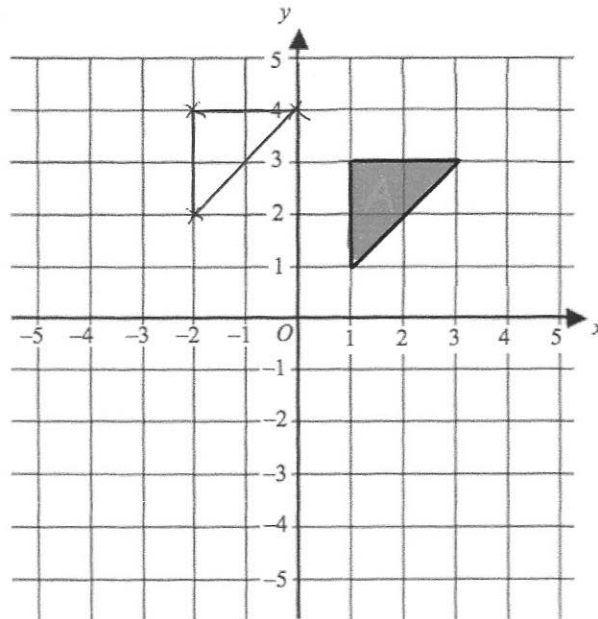Calculate the area of the crate that is in contact with the table.
Include suitable units.

$A = \dfrac{P}{P}$ $\dfrac{22}{500}$ = 0.044m²

or

440cm²

.......440cm²......
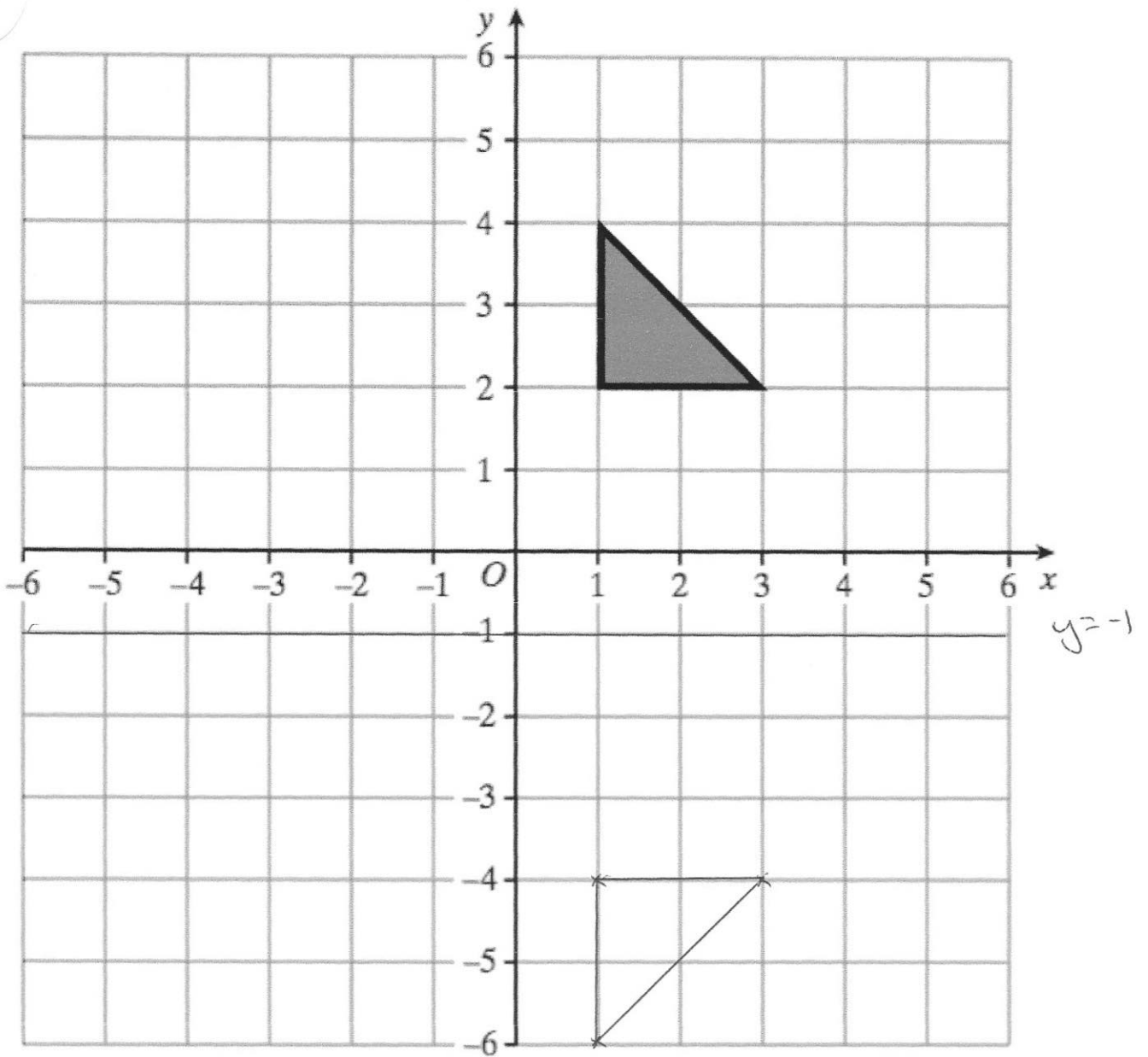
(3)

7b

Translate triangle A by the vector $\begin{pmatrix} -3 \\ 1 \end{pmatrix}$
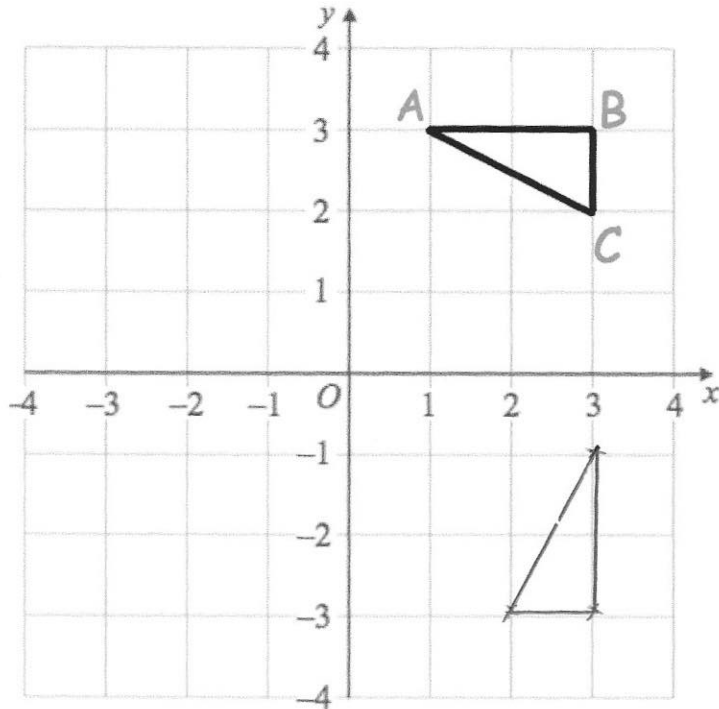
(2)

77

$y=-1$

Reflect the triangle in the line y = –1
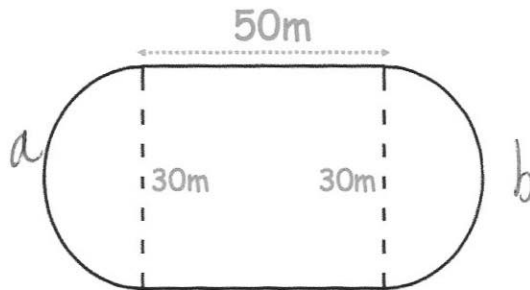Label the new triangle B.

(2)

78.

Rotate triangle ABC 90° clockwise about centre (0, 0)

(3)

---

79. A primary school has a running track.
It has two straights of 50 metres.
Also there are two 'bends' that are semicircles with diameter 30 metres.

Work out the distance around the running track.

$a + b = $ full circle

$\pi \times 30 = 94.2477... \, m$

$50 + 50 + 94.247...$
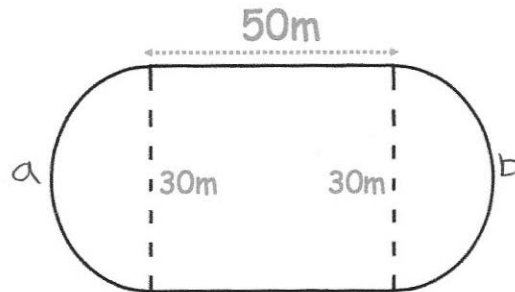
.....194.25.....m

(5)

18. Here are 6 diagrams and 6 labels.
In the diagram the centre of the circle is shown with a dot.

Match each diagram to its label.
One has been done for you.

Label   ## Diagram

Circle and radius

Circle and segment

Circle and arc

Circle and diameter

Circle and tangent

Circle and chord

(4)

80

A primary school has a running track.
It has two straights of 50 metres.
Also there are two 'bends' that are semicircles with diameter 30 metres.

50m

a | 30m   30m | b

Work out the distance around the running track.

a+b = full circle

π × 30 = 94.2477..m

50+50+ 94.247

......194.25......m

(4)

81

The diagram shows a rectangle with a circle cut out.

Not drawn to scale

20cm

8cm
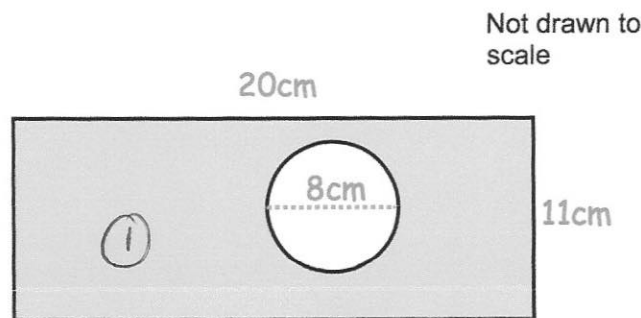
11cm

The rectangle has length 20cm and width 11cm.
The circle has diameter 8cm.

Work out the shaded area.
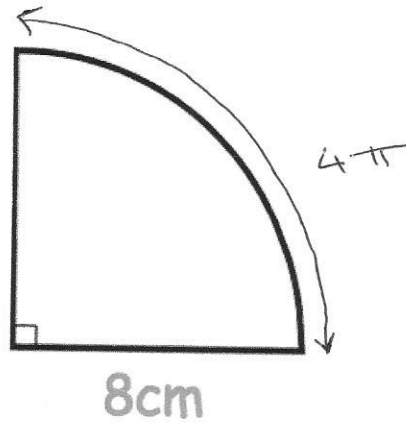Give your answer correct to 2 decimal places.

① 20×11 = 220 cm²

② π ×4² = 50.265...

220 −50.265...

......169.73...cm²

(4)

82

8cm

Calculate the perimeter of the sector.

$C = \pi \times 16$

$= 16\pi$

$16\pi \div 4 = 4\pi$

$8 + 8 + 4\pi$

...........28·6...........cm

(2)

83

120°

8cm
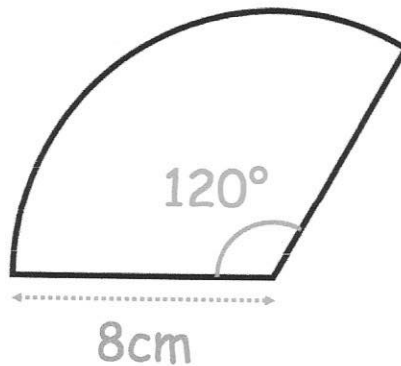
Calculate the area of the sector.

$\dfrac{120}{360} \times \pi \times 8^2$

..............67·02.....cm²

(2)

84. Below is a cylinder with radius 2cm and height 5cm.

5 cm

2 cm
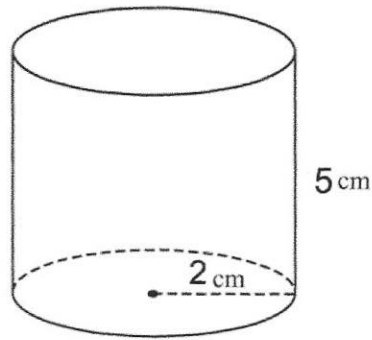
Calculate the volume of the cylinder.

$$V = \pi \times r^2 \times h$$
$$= \pi \times 2^2 \times 5$$
$$= 20\pi$$

62.83

..........................cm³

(3)

85. Write down the exact value of Sin 30°

$\frac{1}{2}$

....

(1)

86.

× 1·6

Not drawn accurately

9cm

B ———— C

5cm

A ———— D

F ———— G

8cm

E ———— H
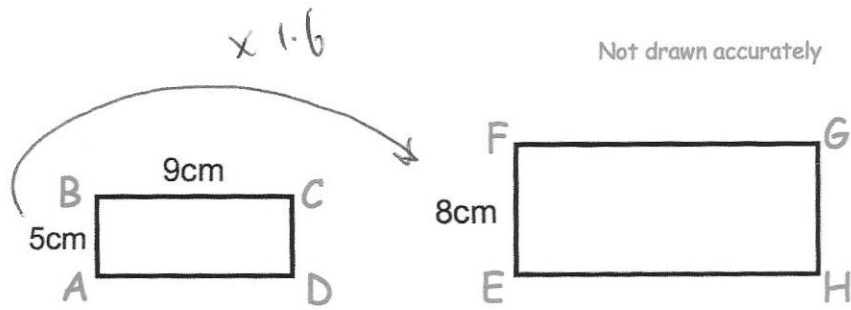
Rectangles *ABCD* and *EFGH* are similar.

AB = 5cm
BC = 9cm
EF = 8cm

Work out the length of FG.

9 × 1·6

14·4

.........................cm

(2)

---

87. A cone has base radius 5cm and perpendicular height 9cm.

9cm

5cm
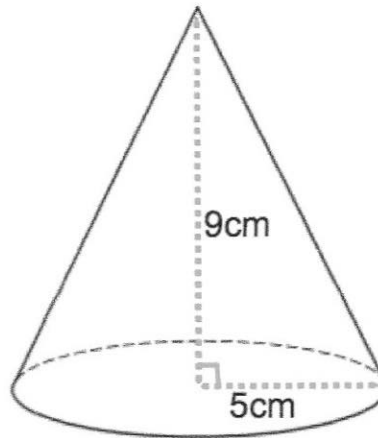
Work out the volume of the cone.

$\frac{1}{3} × \pi × 5^2 × 9$

235·62

.........................cm³

(3)

88. A sphere has a radius of 5cm.

Calculate the surface area of the sphere.

$$4 \times \pi \times 5^2$$

$314.16 \, cm^2$

(3)

---

89. ABCDEF is a regular hexagon, with centre O.
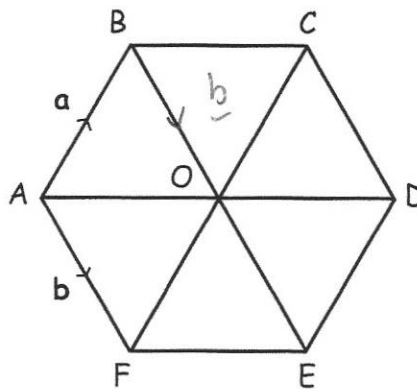
$\overrightarrow{AB} = \mathbf{a}$ $\overrightarrow{AF} = \mathbf{b}$

(a) Express in terms of **a** and **b** the vector $\overrightarrow{FC}$

$2\underline{a}$

(1)

(b) Express in terms of **a** and **b** the vector $\overrightarrow{AO}$

$\underline{a} + \underline{b}$

(1)

90. Given

$$a = 11 - 3^2 \qquad b = \frac{60}{2+3} \qquad c = 18 - 3 \times 2 + 1$$

Work out the value of $a + b + c$

$a = 2$

$b = 12$

$c = 13$

$2 + 12 + 13 = 27$

......27.......

(4)

---

91. Write these numbers in order of size.
Start with the smallest number.

0.92   0.901   0.99   0.099   0.909

0.099   0.901   0.909   0.92   0.99

(1)

---

92. Write down all the factors of 36.

1×36
2×18
3×12
4×9
6×6

1, 2, 3, 4, 6, 9, 12, 18, 36

....

(2)

93. From the list of numbers

    3   6   8   14   16   28   41   64

    (a) write down the cube numbers

    ....8.......... and ....64.......
    (2)

    (b) write down the cube root of 27.

    ....3.......
    (1)

94. Find the HCF of 80 and 32

    factors of 80 : ①,②,④, 5 ,⑧, 10 ,⑯, 20, 40, 80

    factors of 32 : ①②,④,⑧ ⑯ 32

    ....16.......
    (3)

95. Calculate 3^6

    ....729.......
    (1)

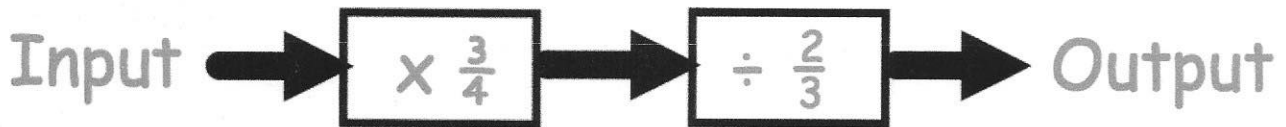96. The attendance at Frome United versus Trowbridge Rovers was 8,701.

    Of this crowd, five-sevenths supported Frome United.
    Calculate how many people did not support Frome United.

    $8701 \div 7 = 1243$

    $1243 \times 2 = 2486$ ....2486.......
    (3)

97.

Input ➡️ [× 3/4] ➡️ [÷ 2/3] ➡️ Output

(a) Find the output, if the input is 2.

$$\frac{2}{1} \times \frac{3}{4} = \frac{6}{4} = \frac{3}{2}$$

$$\frac{3}{2} \div \frac{2}{3} \qquad \frac{3}{2} \times \frac{3}{2} = \frac{9}{4}$$

$\frac{9}{4}$

....
(3)

(b) Find the input, if the output is ½

$$\frac{1}{2} \times \frac{2}{3} = \frac{2}{6} = \frac{1}{3}$$

$$\frac{1}{3} \div \frac{3}{4}$$

$$\frac{1}{3} \times \frac{4}{3} = \frac{4}{9}$$

$\frac{4}{9}$

....
(3)

98.   Write down the reciprocal of 0.35

$$\frac{7}{20} \rightarrow \frac{20}{7}$$

$\frac{20}{7}$

....
(1)

99.   Express 42 as a percentage of 64

$$\frac{42}{64} = 0.65625$$

.....65.625..... %
(2)

100. Joanne sees this special offer in a shop.

Special Offer

Laptop   £465
Printer   £109

Buy both items and receive a 4% discount

Joanne buys both items.

How much does she pay?

$465 + 109 = 574$

$574 \div 100 = 5.74$

$5.74 \times 4 = £22.96$

$574 - 22.96$

£ 551.04

(3)

---

101. Here are four digits.

9   4   7   5

(a) Use two of these digits to make the largest possible two-digit number.

97

(1)

(b) Use all four of these digits to make the four-digit number closest to 5000.

4975

(1)

102. Sophie asks 20 of her friends to choose their favourite sport.

Their replies are

| Rugby	Football	Rugby	Hockey	Cricket
Football	Football	Rugby	Hockey	Football
Rugby	Cricket	Hockey	Football	Football
Football	Rugby	Football	Football	Rugby

Complete the tally and the frequency columns in the table below.

Sport	Tally	Frequency
Rugby	~~HHt~~	6
Football	HHt llll	9
Hockey	lll	3
Cricket	ll	2

(2)

---

103. Shown below are five cards which are arranged in order from smallest to largest

| 5 | 5 | 8 | 8 | 9 |
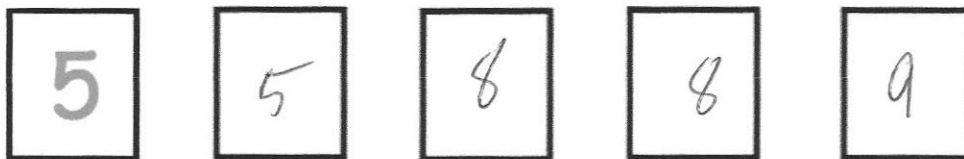
The range of the cards is 4.
The median of the cards is 8.
The mean of the cards is 7.

$5 \times 7 = 35$
$5 + 8 + 9 = 22$
$35 - 22 = 13$

Work out the 4 missing numbers.

5   8   8   9
............, ..., ... and ....

(4)

104 The table shows the number of pages in 100 books.

Number of pages, x	Frequency
$0 < x \leq 100$	7
$100 < x \leq 200$	25
$200 < x \leq 300$	40
$300 < x \leq 400$	12
$400 < x \leq 500$	16

Write down the modal class interval.

$200 < x \leq 300$

(1)

---

105 A manager recorded how long each customer spent in his supermarket.
The table shows his results.

Time, t (minutes)	Frequency
$0 < t \leq 10$	24
$10 < t \leq 20$	31
$20 < t \leq 30$	50
$30 < t \leq 40$	35
$40 < t \leq 50$	60

200

— 105

Which class interval contains the median?

$\dfrac{200}{2} = 100^{th}$

or

$\dfrac{201}{2} = 100 \cdot 5^{th}$

$20 < t \leq 30$

(1)

106.

Name	Price (£)	Mass (kg)	Thickness (cm)	Battery (minutes)
Epic	£799	1.23	1.89	690
Bell	£1249	1.2	1.52	650
Lemon	£1599	1.37	1.49	720
HB	£799	1.28	1.7	740
Lazer	£1049	1.35	1.66	660

(a) Which laptop is the thickest?

Epic

(1)

(b) How much longer does the HB battery last than the Bell battery?

90 mins

(1)

107. 480 students attend a school.

A teacher asks 50 students which colour they would like the new school blazer to be.
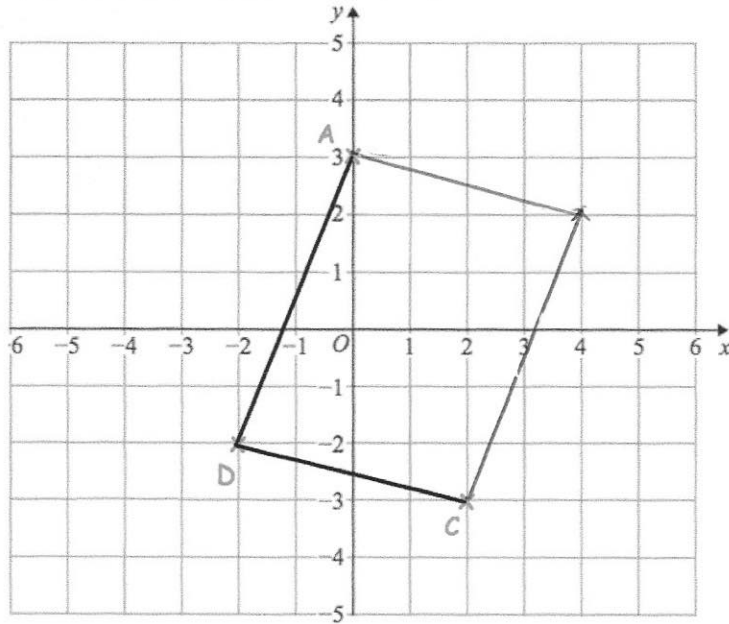
The table shows the results.

Colour	Number of students
Black	20
Navy	15
Green	9
Maroon	6

Estimate how many of the 480 students would like a black blazer.

$$\frac{20}{50} \times 480$$

192

(2)

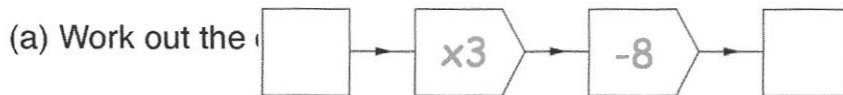108. The points A (0, 3), C (2, -3) and D (-2, -2) are shown.

ABCD is a parallelogram.
Complete the parallelogram and write down the coordinates of B.

(....4...... , ...2......)

(2)

109.

(a) Work out the

□ —→ x3 —→ -8 —→ □

......22......

(1)

(b) Work out the input, when the output is 13.

7
....

(1)

(c) If the input is the same as the output, work out the input.

$3x - 8 = x$
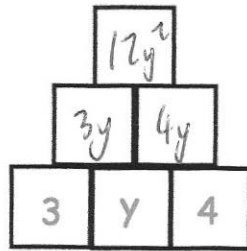
$2x = 8$

$x = 4$

4
....
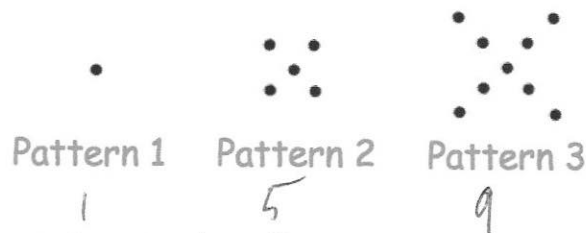
(1)

110.

$12y^2$

$3y$ $4y$

3 Y 4

To find the contents of each empty box, multiply the two terms directly beneath it.

Complete the multiplication pyramid.

(3)

---

111. Here is a pattern of dots

Pattern 1   Pattern 2   Pattern 3
    1   5   9

(a) Continue the pattern to show Pattern 4

(2)

(b) How many dots will there be in Pattern 6?

17   21

21
....

(1)

(c) Which pattern will use 77 dots?

$4n - 3 = 77$

$n = 20$

20th
....

(1)

(d) Explain why there will **not** be a pattern that uses 200 dots.

All the patterns have an odd number of dots.

(1)

112. Circle the geometric progression.

11, 9, 7, 5 ...   1, 4, 9, 16 ...   11, 21, 31, 41 ...   (1, 4, 16, 64 ...)

(1)

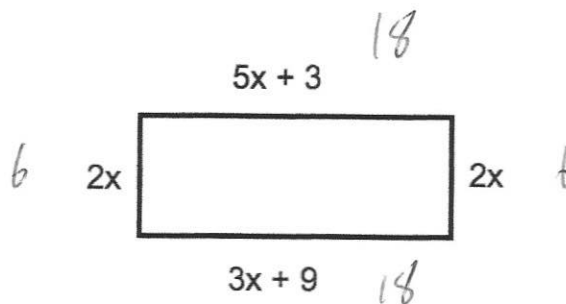113. Work out the *n*th term for this sequence

8   17   26   35   44   ...   ...

$9n$ 9   18   27   36

$$9n - 1$$

(2)

114.

18

5x + 3

6   2x   2x   6

3x + 9   18

The diagram shows a rectangle. The sides are measured in centimetres.

(a) Explain why 5x + 3 = 3x + 9

Opposite sides of a rectangle have equal length.

(1)

(b) Solve   5x + 3 = 3x + 9

$2x + 3 = 9$
$2x = 6$
$x = 3$

x = 3 cm

(2)

(c) Calculate the perimeter of the rectangle.

6 + 18 + 6 + 18

48 cm

(2)

115
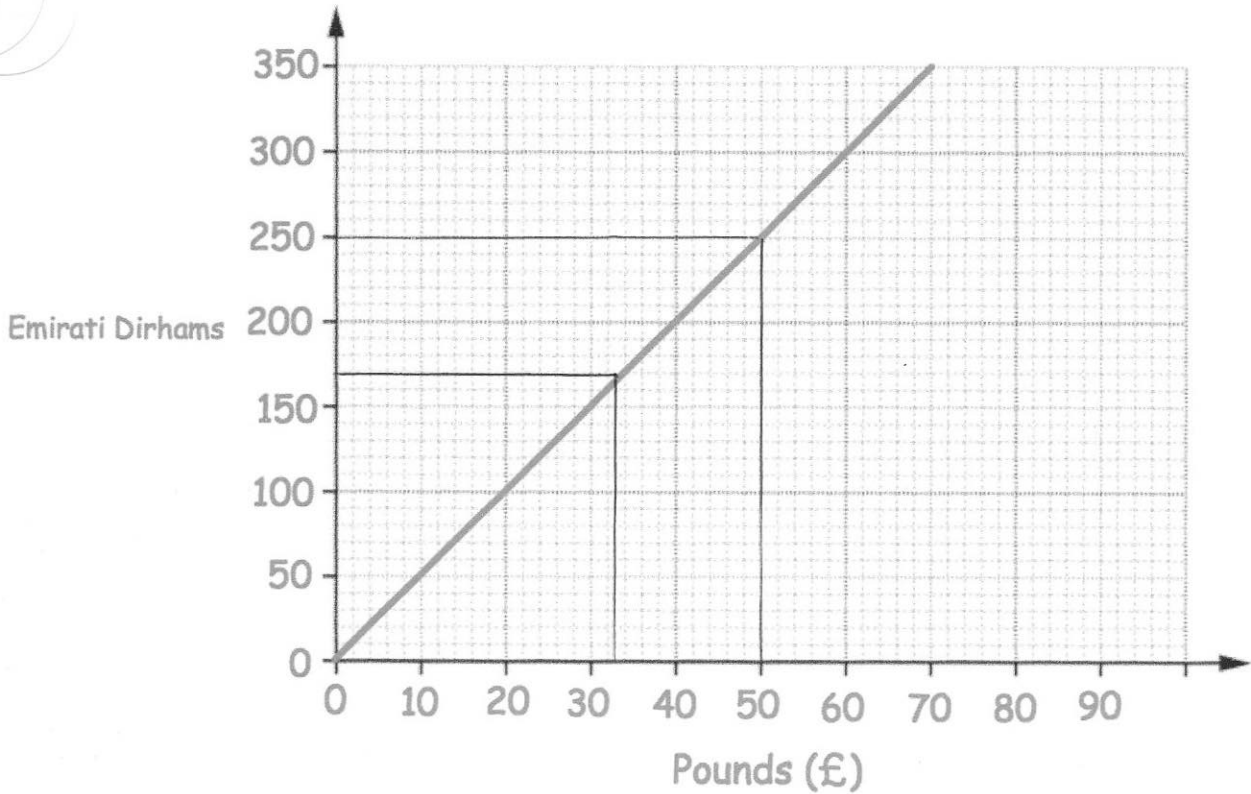
(a) Convert £50 into Dirhams.

..........250..........Dirhams

(1)

(b) Convert 175 Dirhams into Pounds (£).

£...35...

(1)

Tom wants to buy a camera.
In London the camera costs £380.
In Abu Dhabi the camera costs 2000 Dirhams.

In which city is the camera cheaper and by how much?
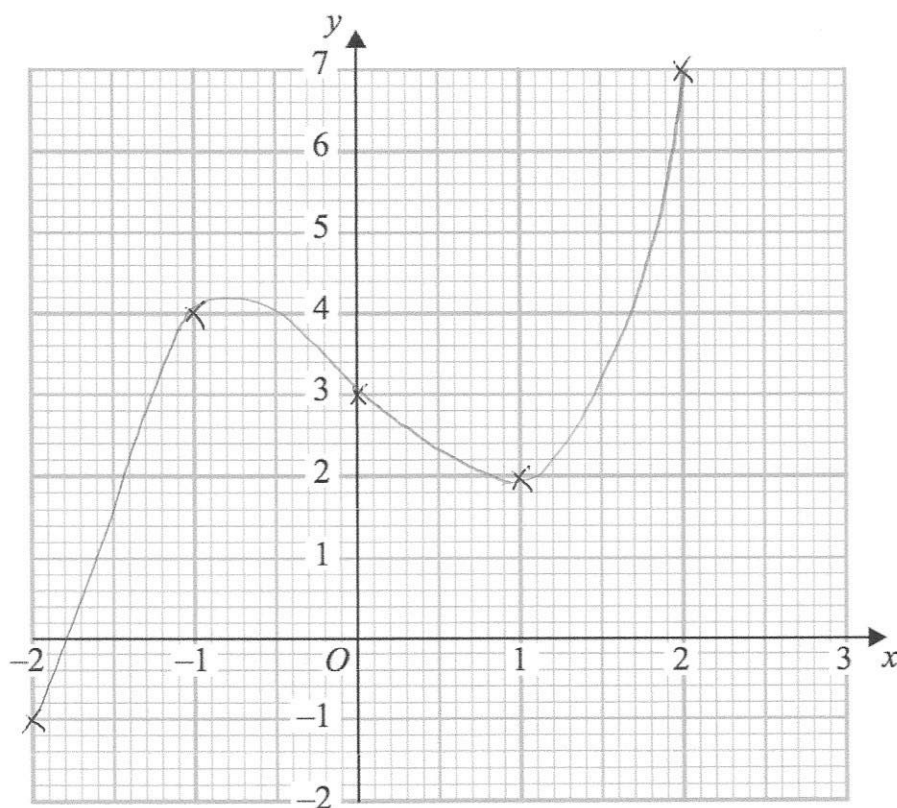Give your answer in pounds.

2000 dirhams = £400

City:...London... £...20...

(1)

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(a) Complete the table of values for $y = x^3 - 2x + 3$

x	-2	-1	0	1	2
y	-1	4	3	2	7

(2)

(b) On the grid, draw the graph of $y = x^3 - 2x + 3$ for the values of x
$-2 \leq x \leq 2$

(2)