

Paper 2 and Paper 3 Preparation Paper

Edexcel Higher



Corbettmαths

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



Question	Topic	Video number
Starred Topics		
1	Use of a Calculator	352
2	Estimation	215
3	Best Buys	210
4	Currency	214a
5	Indices	172,174
6	Fractional/Negative Indices	173, 175
7	Percentages of Amounts	234,235,238
8	Conversion Graphs	151, 152
9	Simple Interest	236a
10	Compound Interest	236
11	Reverse Percentages	240
12	Ratio	270,271,271a,271b,271c
13	Limits of Accuracy	183,184
14	Product Rule for Counting	383
15	Error Intervals	377,280
16	LCM/HCF	218, 219
17	Factorising	117
18	Factorising Quadratics	118,119,120,119a
19	Product of Primes	223, 224
20	Standard Form	300, 301, 302, 303
21	Direct Proportion	254
22	Substitution	20
23	Equations	110,113,114,115
24	Changing the Subject	7, 8
25	Inverse Proportion	255
26	Midpoint of a Line	198
27	Linear Graphs	191,186,189,194
28	Real-life Linear Graphs	171a

Question	Topic	Video number
29	Angles in Parallel Lines	25,39
30	Bearings	26,27
31	Constructions	78,72,79,80,70
32	Loci	75,76,77
33	Views	354
34	Metric Units (Area/Volume)	350, 351
35	Circumference	60
36	Area of a Circle	40
37	Arc Length	58
38	Area of a Sector	48
39	Volume of a Cylinder	357
40	Pythagoras	257,259
41	Trigonometry	329,330,331
42	3D Trig and Pythagoras	259,332
43	Volume of a Prism	356
44	Volume of a Cone/Pyramid/Sphere	359-361
45	Volume of a Frustum	360a
46	Translations	325
47	Surface Area of Cones/Spheres	314, 313
48	Reflections	272
49	Sine Rule	333
50	Cosine Rule	335, 336
51	$\frac{1}{2}ab\sin C$	337
52	Vectors	353
53	Travel Graphs	171
54	Column Vectors	353a
55	Speed, Distance, Time	299
56	Density	384
57	Pressure	385
58	Two-way Tables	319

Question	Topic	Video number
59	Pie Charts	163,164
60	Negative Scale Factors	104, 106, 107, 108
61	Cumulative Frequency	153,154
62	Box Plots	149
63	Estimated Means	55
64	Combined Mean	53a
65	Median (frequency table)	51,52
66	Modal Class	56a
67	Samples	281a
68	Tree Diagrams	252
69	Capture Recapture	391
70	Venn Diagrams	380
71	Parallel Lines	196
72	Perpendicular Lines	197
73	Simultaneous Equations	295
74	Non-linear Simultaneous Equations	298
75	Equation of a Circle	12
76	Equation of a tangent	372
77	Rotations	275
78	Reciprocal Graphs	346
79	Exponential Graphs	345
80	Geometric Sequences	375
81	Quadratic Formula	267
82	Geometric Proof	366
83	Transformations of Graphs	323,324
84	Congruent Triangles	67
85	Invariant Points	392
86	Frequency Trees	376
87	Frequency Polygons	155, 156
88	Stem-and-leaf	169,170

Question	Topic	Video number
89	Relative frequency	248
90	Quadratic Graphs	264
91	Solving Quadratics Graphically	367
92	Sketching Quadratics	265
93	Cubic Graphs	344
94	Angles in Polygons	32
95	Independent Events	250
96	Conditional Probability	247
97	Instantaneous rates of Change	390a
98	Average rates of Change	390b
99	Area under a Graph	389
100	Composite Functions	370
101	Inverse Functions	369
102	Algebraic Proof	365
Other Unseen Topics (or usually more prominent)		
103	Adding Fractions	133
104	Multiplying Fractions	142
105	Dividing Fractions	134
106	Reciprocal	145
107	Inequalities	177,178,179
108	Area of a Triangle	49
109	Similar Shapes	292
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111	Collecting Like Terms	9
112	Distance between 2 points	185
113	Drawing Histograms	157
114	Quartiles	57a
115	Graphical Simultaneous Equations	297
116	Percentage Change	233
117	Expanding Brackets	13,14,15

Question	Topic	Video number
118	Algebraic Fractions	21,22,23,24
119	nth term (quadratics)	388
120	Circle Theorems	64, 65
121	Iteration	373,373a,373b
Seen Topics (remember they may still appear, so they may be worthwhile recapping)		
See website	Decimals	90, 91, 92, 93, 94
See website	Recurring Decimals to Fractions	96
See website	Surds	305 to 308
See website	nth Term	288, 289
See website	Graphical Inequalities	378
See website	Exact Trig Values	341
See website	Surface Area of a Prism	311
See website	Scatter Graphs	165, 166
See website	Trigonometric Graphs	338, 339
See website	Completing the Square	10, 371
See website	Proportion (Application)	255c
See website	Quadratic Inequalities	378

1. Use your calculator to work out

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

Write your answer to 3 significant figures.

2. Use approximations to estimate the value of

$$\frac{596.4 \times 2.06}{0.521}$$

.....
(3)

-
3. 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)

4. 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)

5. Simplify

$$\frac{a^{1/5} \times a^{2/3}}{a^{3/5}}$$

.....
(2)

6. (a) Write 32 in the form 4^n

.....
(2)

(b) Write $\frac{1}{8}$ in the form 2^n

.....
(2)

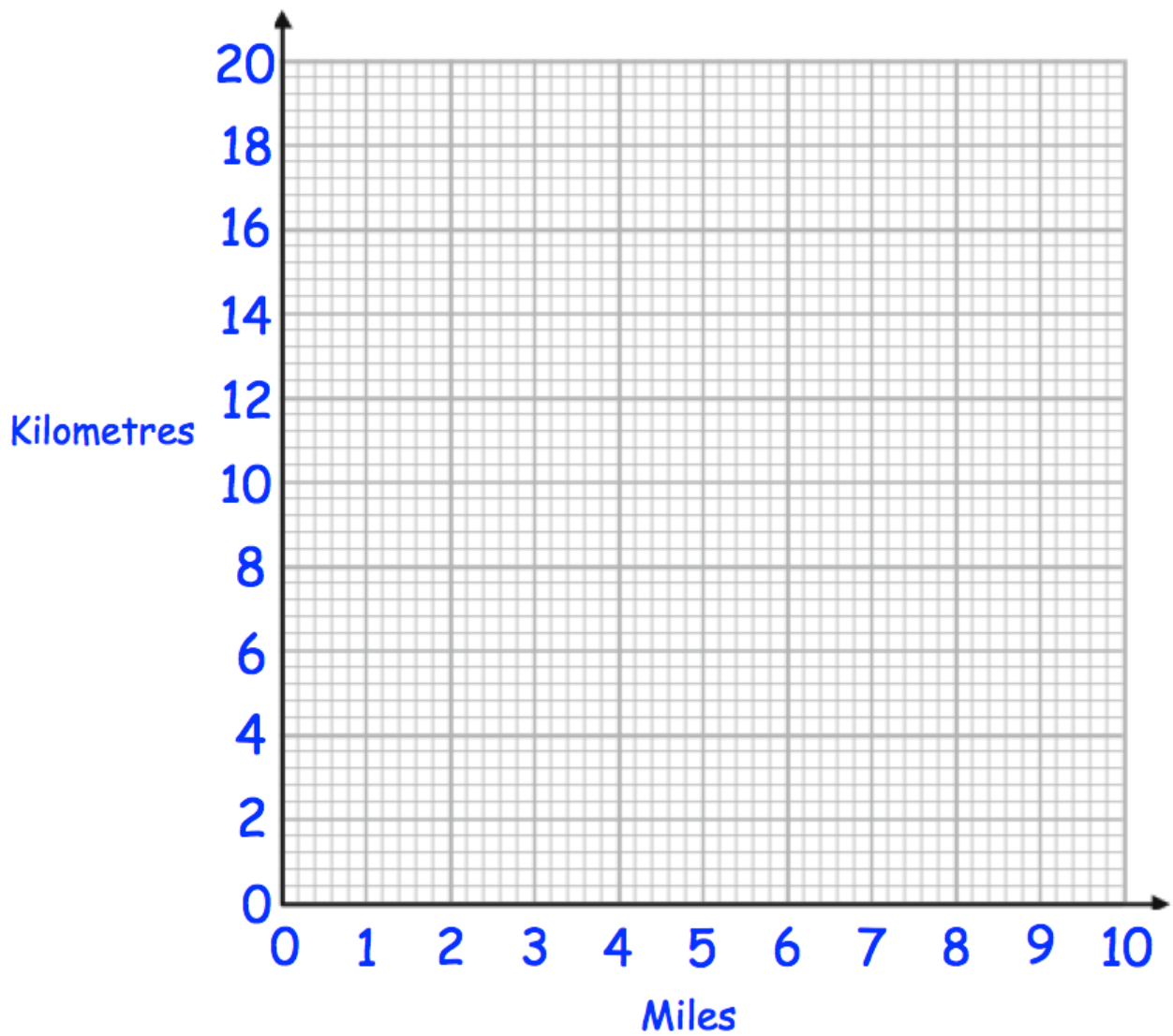
7. Harriet travelled from Bath to Cardiff.
Her average speed was 58 miles per hour.

There is traffic on the return journey.
Her average speed is reduced by 23%

Work out the average speed on the return journey.

.....mph
(3)

8. (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)

9. 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.

£.....

(3)

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

Bank of Maths

Double your money in 15 years.

The average annual growth for your investment is 4.5%

Will Martyn double his money in 15 years by investing his money with “Bank of Maths?”

You **must** show your workings.

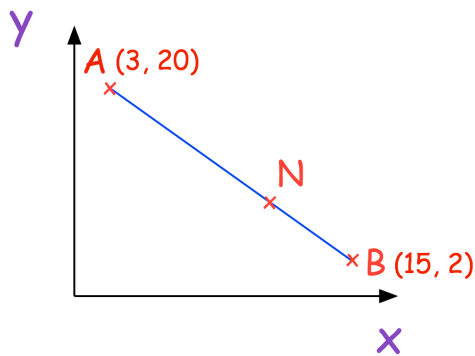
(4)

11. 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)

-
12. 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.

.....
(3)

13. 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)

14. Jacob picks a 5-digit **even** number.

The first digit is a prime number.
The third digit is odd.
The fourth digit is 8

How many different 5-digit number could he pick?

.....
(3)

15. 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)

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

.....
(2)

17. Factorise fully

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

.....
(2)

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

.....
(2)

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

.....
(2)

19. (a) Express 108 as a product of its prime factors.
Give your answer in index form.

.....
(3)

- (b) Find the Highest Common Factor (HCF) of 108 and 72.

.....
(2)

-
20. (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)

21. y is directly proportional to the square of x .
When $y = 24$, $x = 2$.

Find the value of y when $x = 4$.

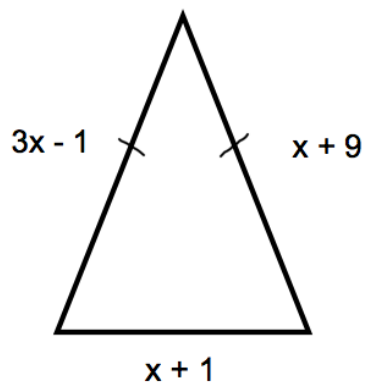
$y = \dots\dots\dots$
(3)

22. $v = u + at$

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

$\dots\dots\dots$
(3)

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



Find the perimeter of the triangle

$\dots\dots\dots$
(4)

24. Make v the subject of the formula.

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

$v = \dots\dots\dots$
(3)

25. 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.

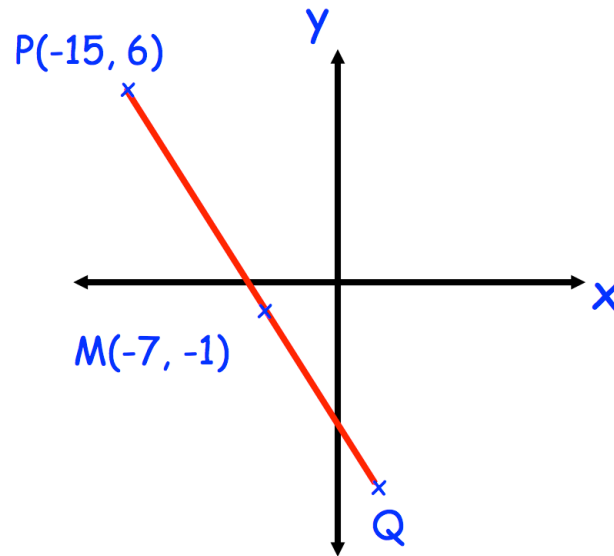
(a) Find an equation connecting t and s .

$\dots\dots\dots$
(3)

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

$\dots\dots\dots$
(3)

26.

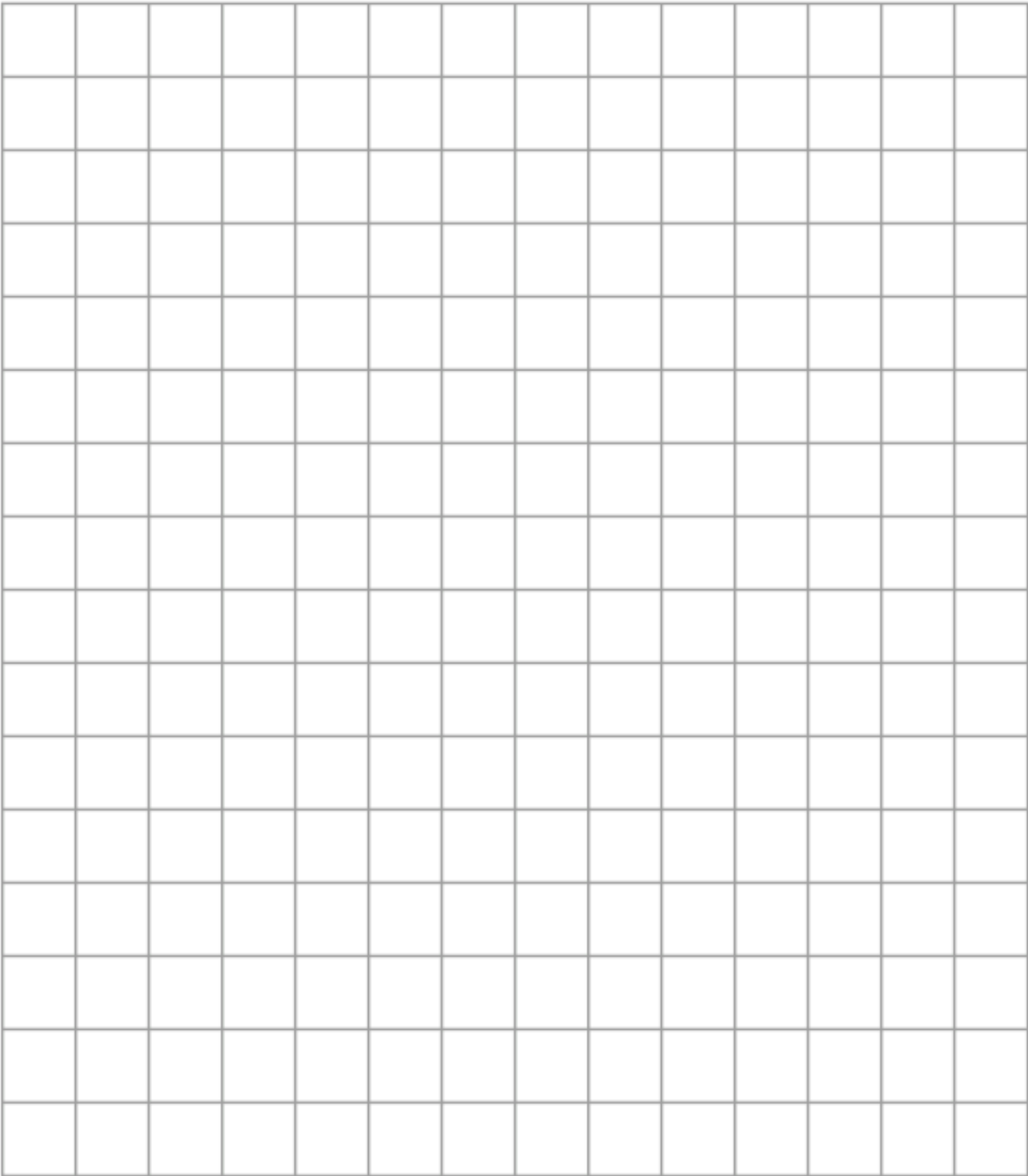


M is the midpoint of PQ

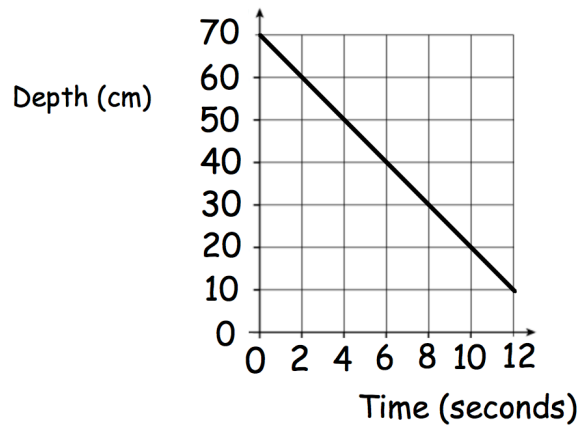
Write down the coordinates of the point Q.

.....
(2)

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



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



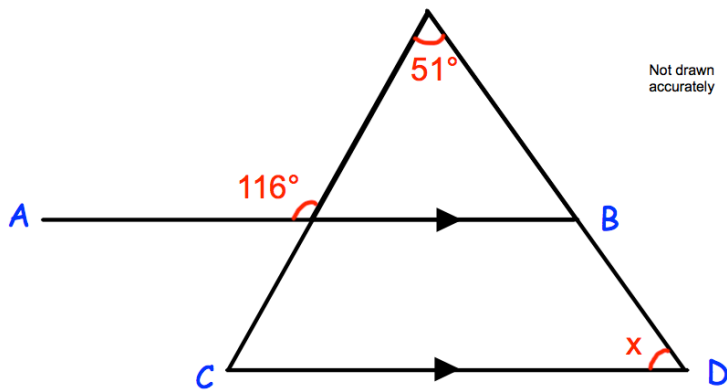
(a) Write down the gradient of the line

.....
(1)

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

.....
(1)

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

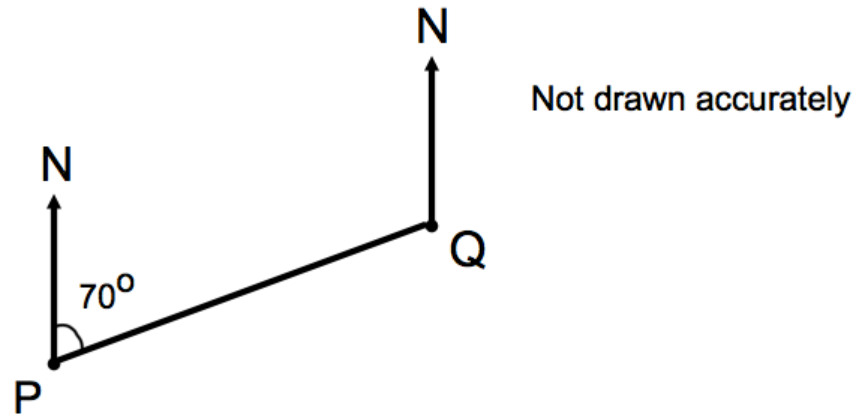


Work out the size of angle x.

You **must** show your workings.

.....°
(4)

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

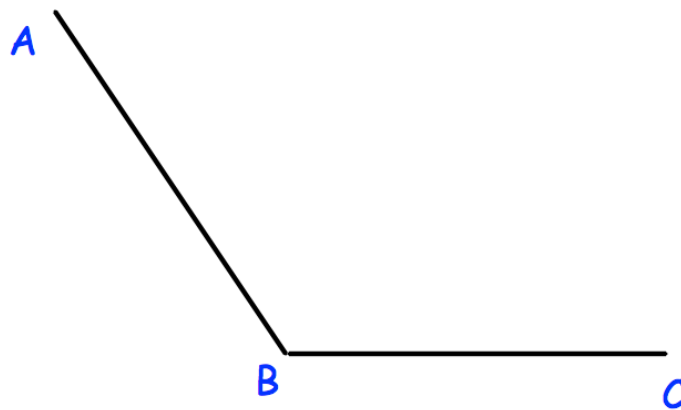


The bearing of Q from P is 070°

Calculate the bearing of P from Q.

.....^o
(2)

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



(2)

32. 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)

33. The front elevation of a solid shape is a circle.
The side elevation of the solid shape is a rectangle.
The plan view of the solid shape is a rectangle.

Write down the name of the shape.

.....
(1)

34. Convert 552 cm^2 into m^2

..... m^2
(1)

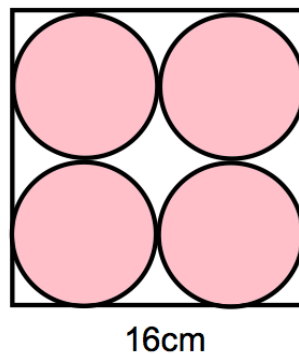
35. James has a bicycle.
Each wheel has diameter 45cm .

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)

36. A logo is designed that has four pink circles within a white square.

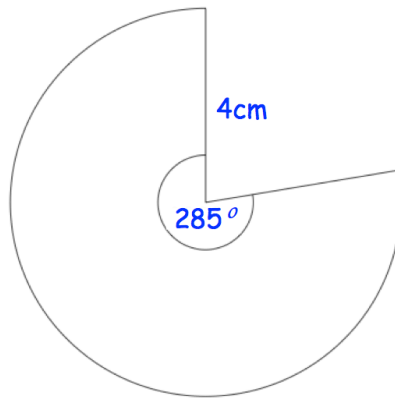


The square has side length 16cm .

Find the area of the logo that is white.

..... cm^2
(5)

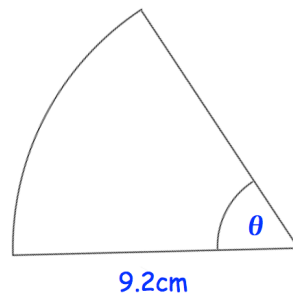
37.



Calculate the perimeter of the sector.

.....cm
(3)

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



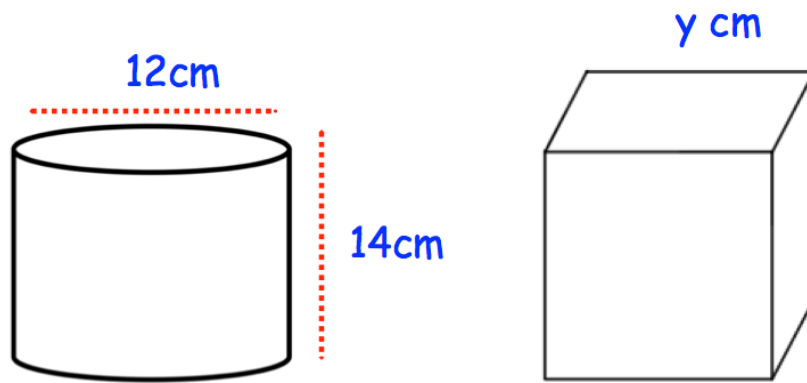
The area of the sector is 38.4cm²

Find the size of angle θ

Give your answer to 2 significant figures.

.....°
(3)

39.

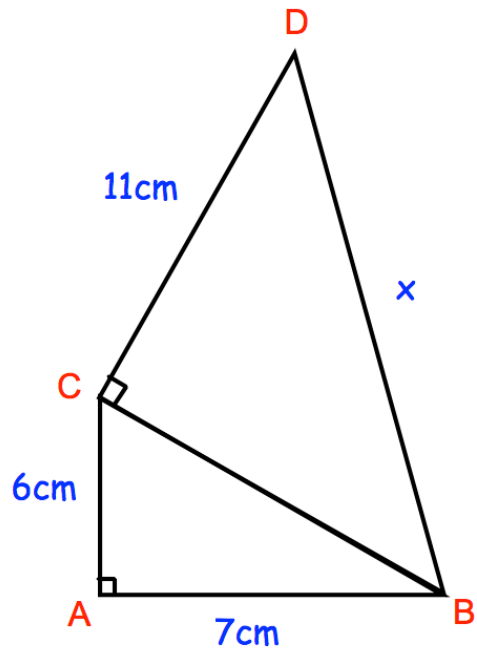


A cylinder has diameter 12cm and height 14cm.
A cube has side length y cm.
The cylinder and cube has the same volume.

Find y .

..... cm
(4)

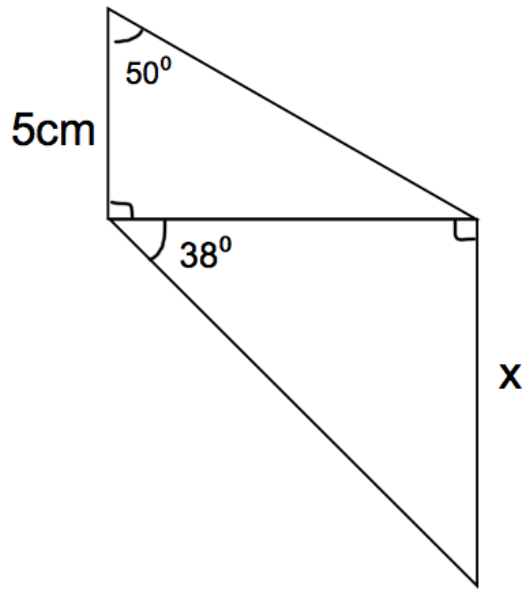
40. Below are two triangles, ABC and BCD.



Find x

.....cm
(4)

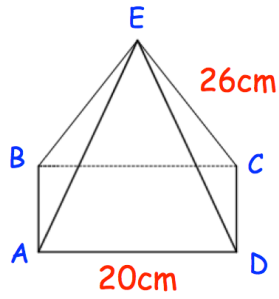
41. The diagram shows two right-angled triangles.



Calculate the value of x .

.....cm
(5)

42. 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)

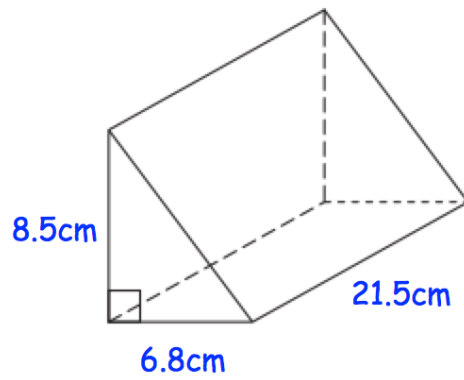
- (b) Calculate angle CAE

.....°
(2)

- (c) Work out the height of the pyramid

.....cm
(2)

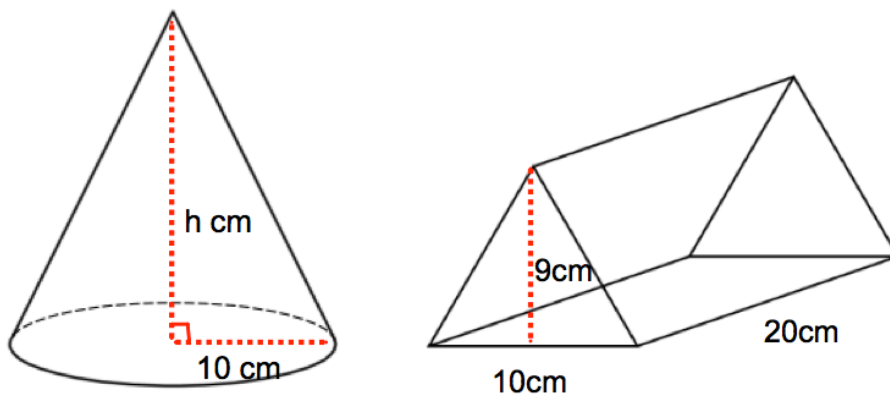
43. Shown below is a triangular prism.



Find the volume of the triangular prism.

.....cm³
(3)

44. Shown is a cone and a triangular prism.

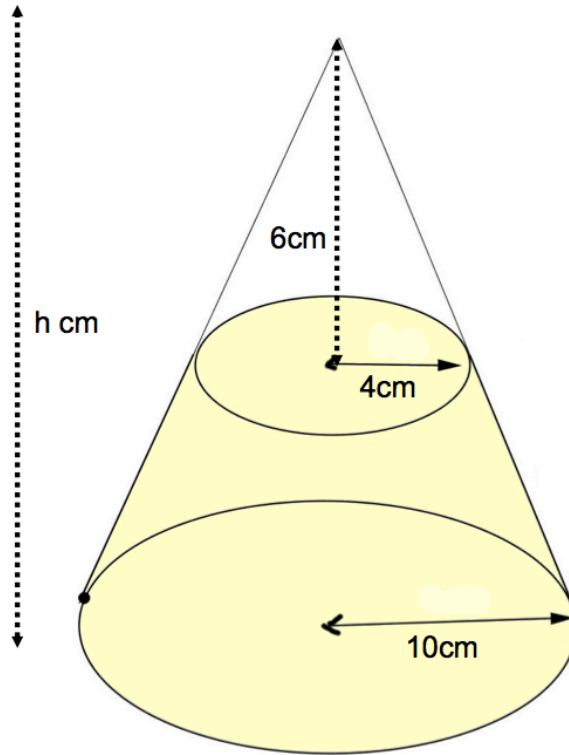


Both solids have the same volume.

Calculate the height of the cone.

.....cm
(3)

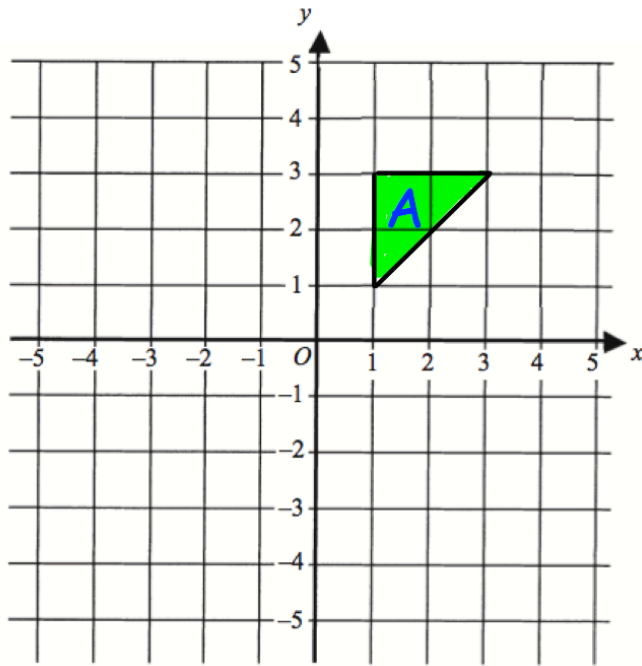
45. A cone below has base radius 10cm and height h cm.
A smaller cone radius 4cm and height 6cm is cut from the top.
The frustum is shown below.



Calculate the volume of the frustum.

.....cm³
(5)

46.



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

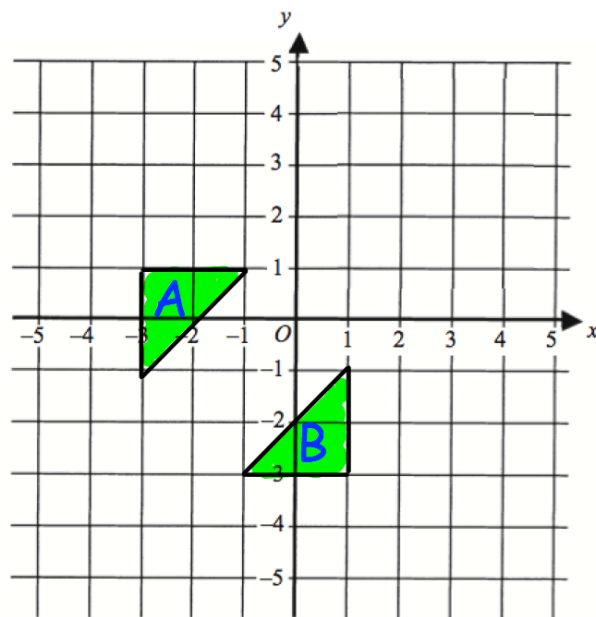
(2)

47. A sphere has a radius of 5cm.

Calculate the surface area of the sphere.

.....
(3)

48.



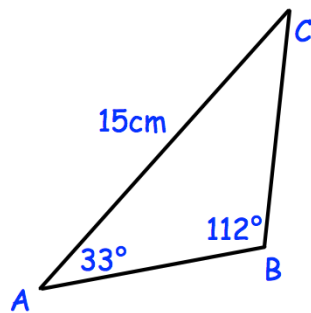
Describe fully the single transformation that maps triangle A onto triangle B.

.....

.....

(2)

49.



In triangle ABC the length of AC is 15cm.

Angle ABC = 112°

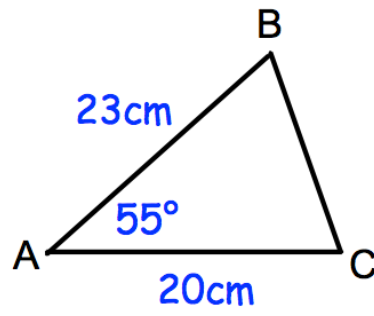
Angle BAC = 33°

Work out the length of BC.

.....cm

(3)

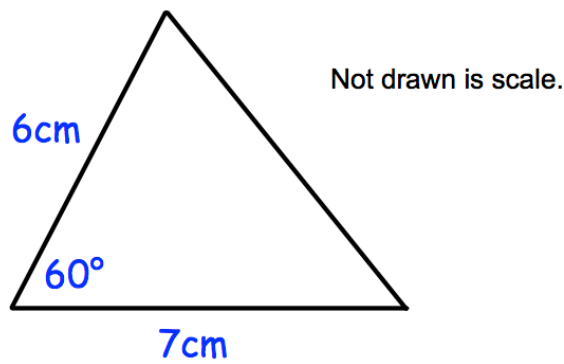
50.



Calculate the length of BC.

.....cm
(3)

51.

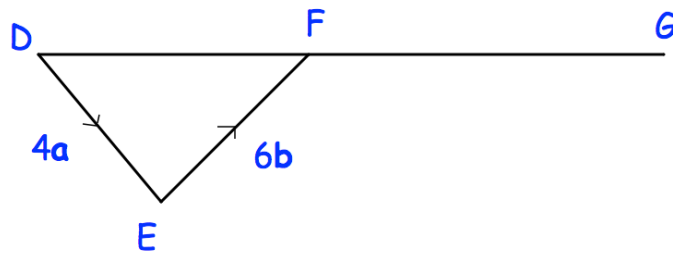


Calculate the area of the triangle.

.....cm²
(2)

52. DFG is a straight line.

$$\vec{DE} = 4\mathbf{a} \quad \text{and} \quad \vec{EF} = 6\mathbf{b}$$



(a) Write down the vector \vec{DF} in terms of \mathbf{a} and \mathbf{b}

.....
(1)

(b) $DF : FG = 2:3$

Work out the vector \vec{DG} in terms of \mathbf{a} and \mathbf{b}
Give your answer in its simplest form.

.....
(2)

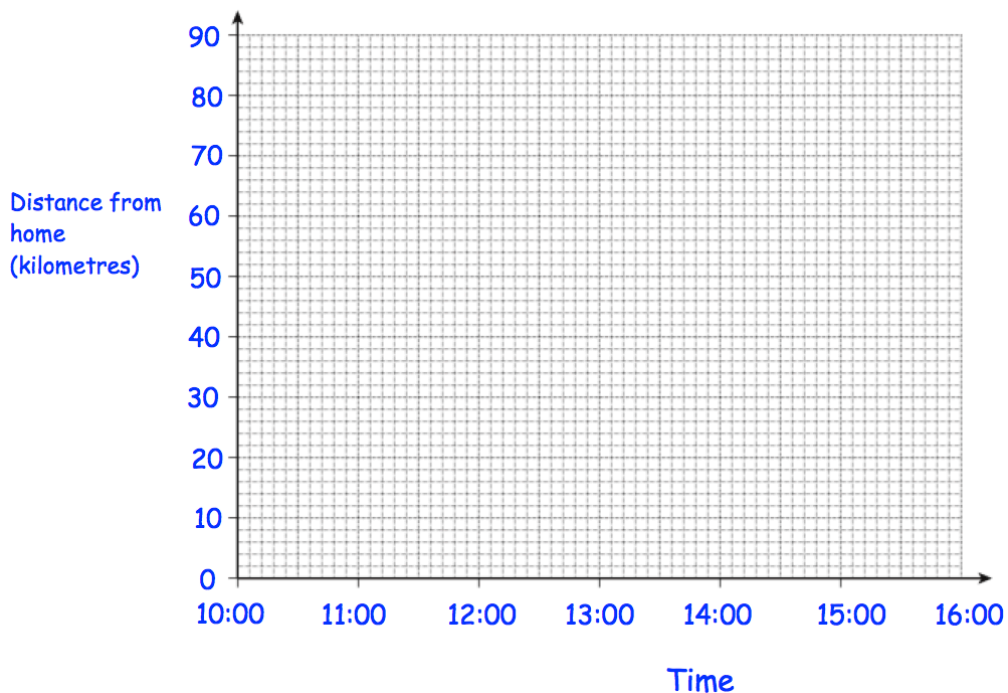
53. Bethany drove to a family meal and then back home.
The meal was at a restaurant that is 70 kilometres from her home.

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.



(3)

54. $\mathbf{a} = \begin{pmatrix} 9 \\ 6 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$

Work out $3\mathbf{a} - \mathbf{b}$

$$\begin{pmatrix} \dots \\ \dots \end{pmatrix} \quad (2)$$

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

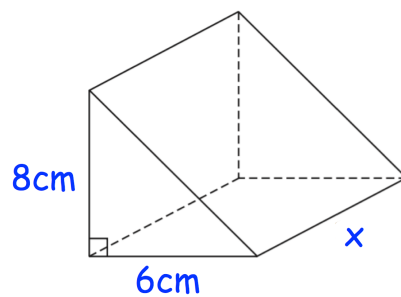
A car drives 19 miles in 22 minutes.

Is the car breaking the speed limit?

You must show your workings.

(3)

56. 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/cm^3

Calculate the length of the prism.

.....cm

(4)

57. 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)

58. 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.

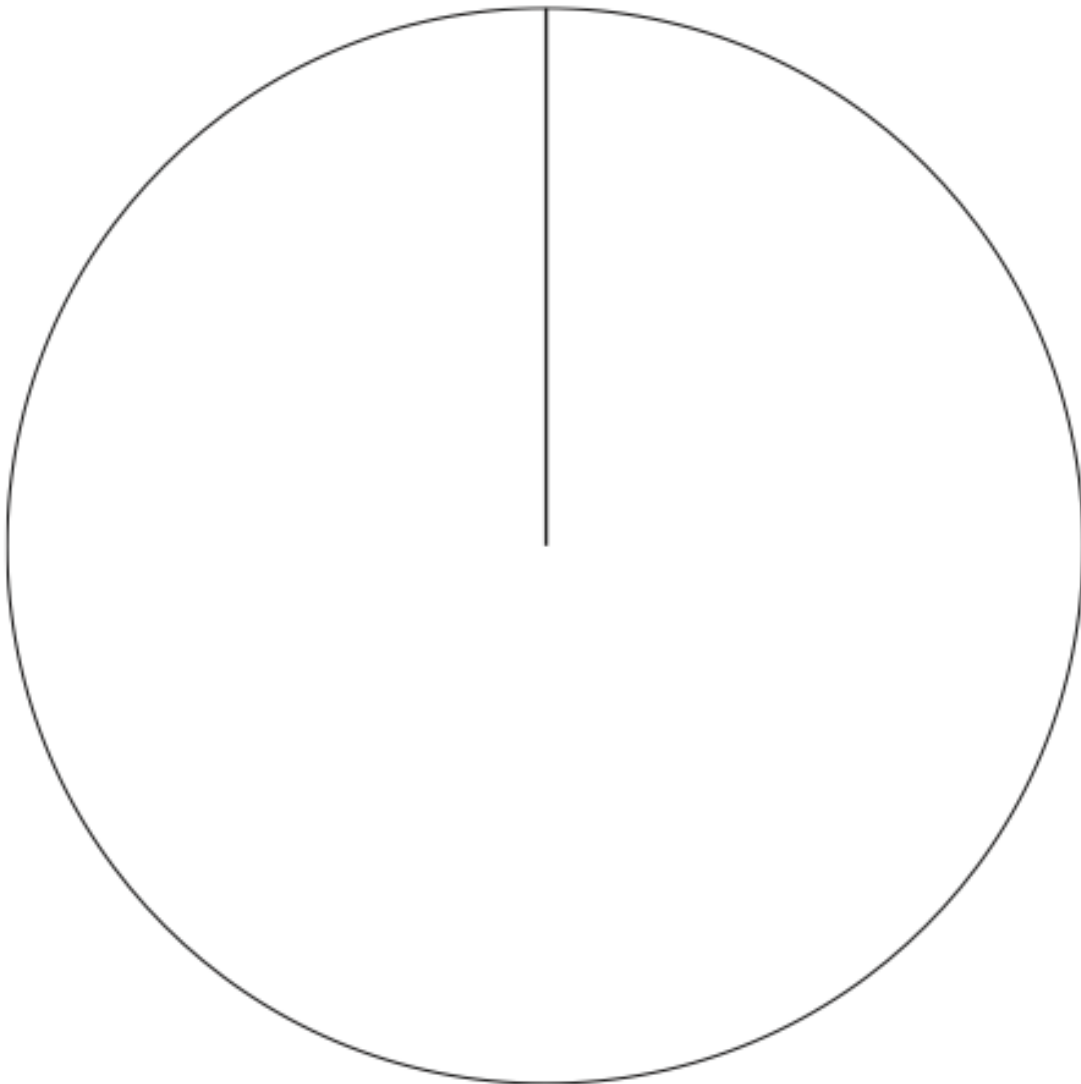
Work out the number of Year 12 students who study German.

.....
(4)

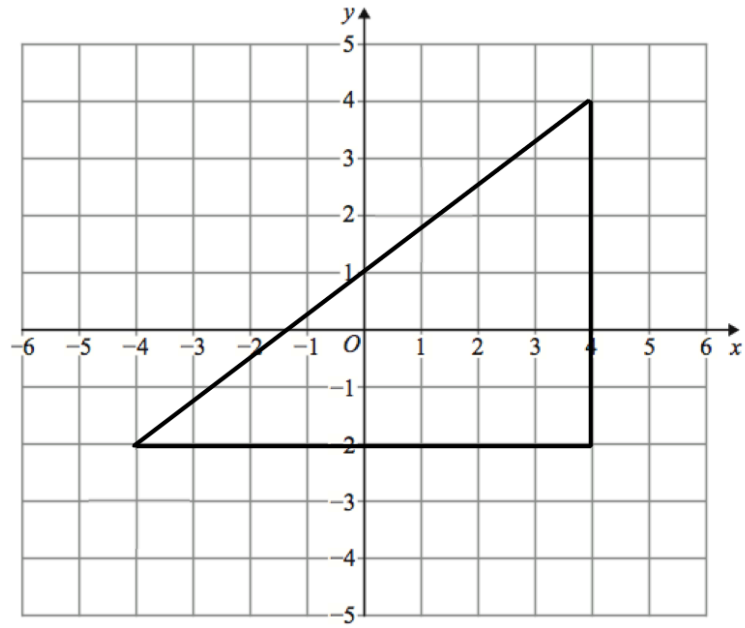
59. The table gives information about the number of students in years 7 to 10.

Year	Frequency
7	200
8	140
9	220
10	160

Draw an accurate pie chart to show this information.



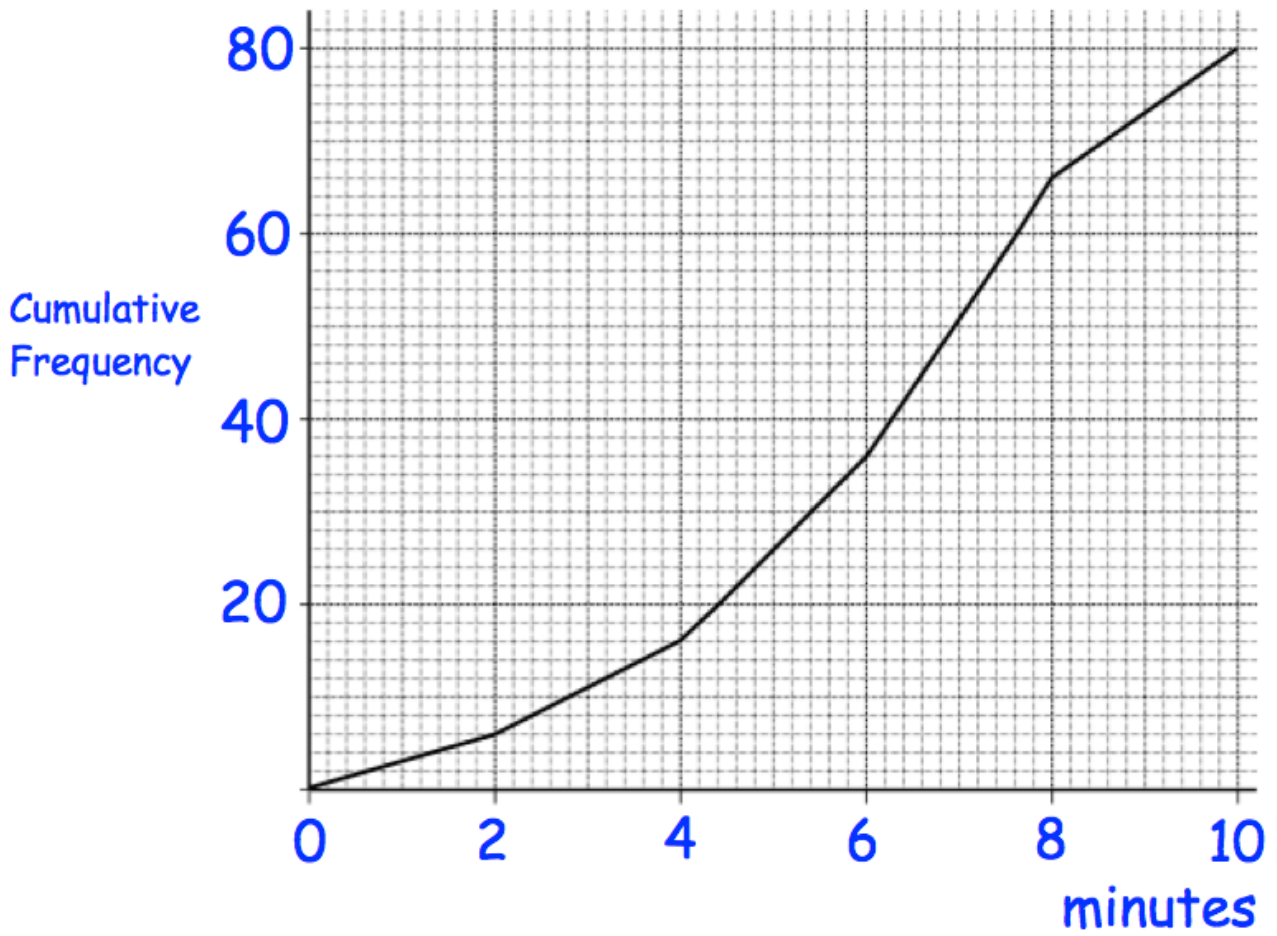
60.



Enlarge the triangle by scale factor $-\frac{1}{2}$, using centre of enlargement (2, 0)

(3)

61. The length of time, in minutes, that 80 customers spend in a shop was recorded. A cumulative frequency diagram of this data is below.



(a) Find an estimate of the median.

.....minutes
(1)

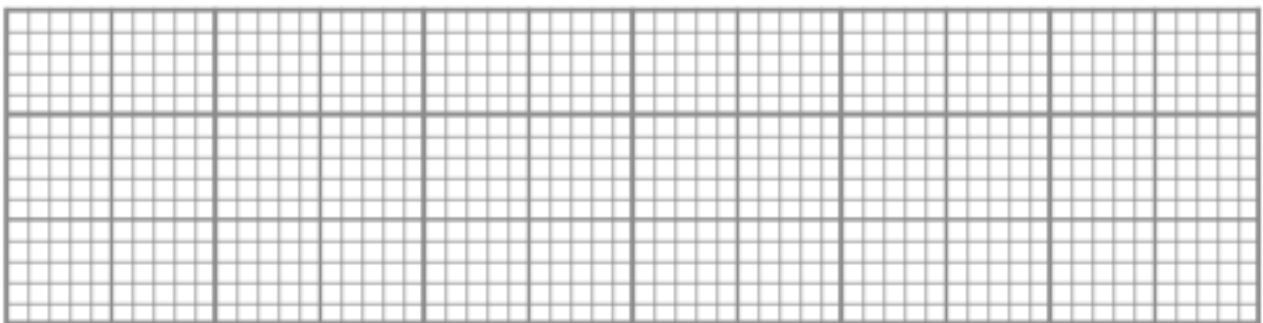
(b) Estimate how many customers spent more than 5 minutes in the shop.

.....
(1)

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

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

Draw a box plot to show this information.



(3)

63. 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)

64. 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.

.....
(2)

65. 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

Which class interval contains the median?

.....
(1)

66. 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.

.....
(1)

67. 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.

.....
(2)

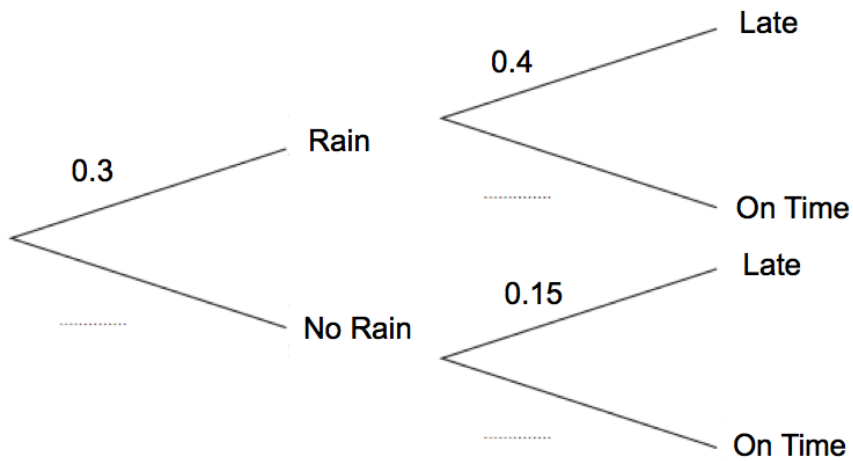
68. In a small village, one bus arrives a day.

The probability of rain in the village is 0.3.

If it rains, the probability of a bus being late is 0.4.

If it does not rain, the probability of a bus being late is 0.15.

(a) Complete the tree diagram



(2)

(b) Work out the number of days the bus should be late over a period of 80 days.

.....
(3)

69. A group of scientists want to estimate the number of eels in a lake.
They catch and ring 40 eels.
They return the 40 eels to the lake.
They then catch 180 eels and 23 are ringed.

Estimate the number of eels in the lake.

.....
(2)

70. A gym runs two fitness classes, spinning and circuits.

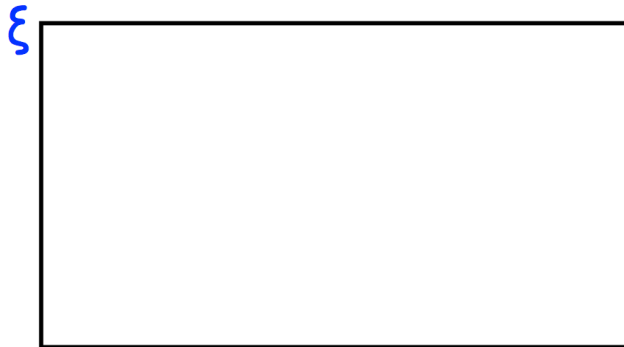
On Saturday 100 people visited the gym.

18 people attended the spinning class.

10 people attended both classes.

56 people did not attend either class.

(a) Represent this information on a Venn diagram



(3)

A person who attended the gym is selected at random.

Find the probability that this person

(b) attended only circuits

.....
(2)

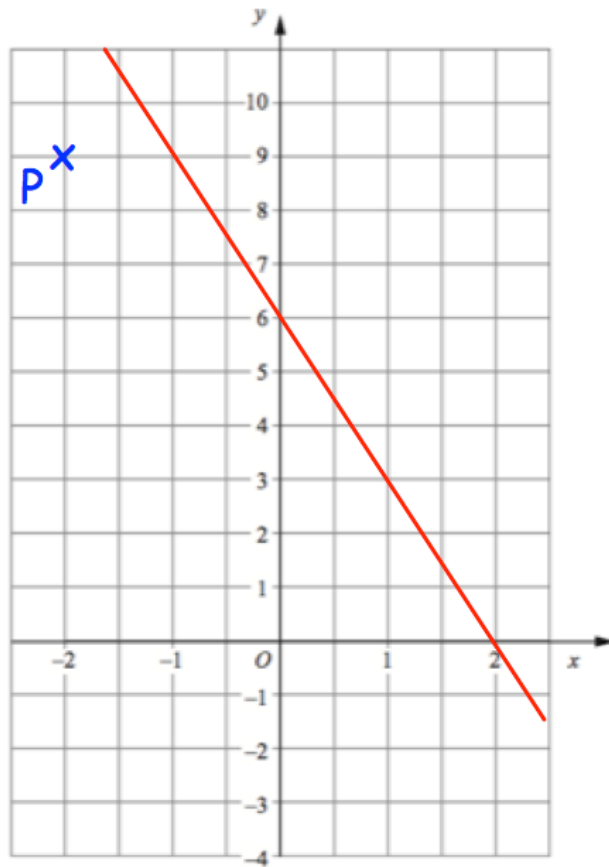
(c) attended exactly one class

.....
(2)

(d) attended spinning, given that they attended circuits

.....
(2)

71.



(a) Find the equation of L.

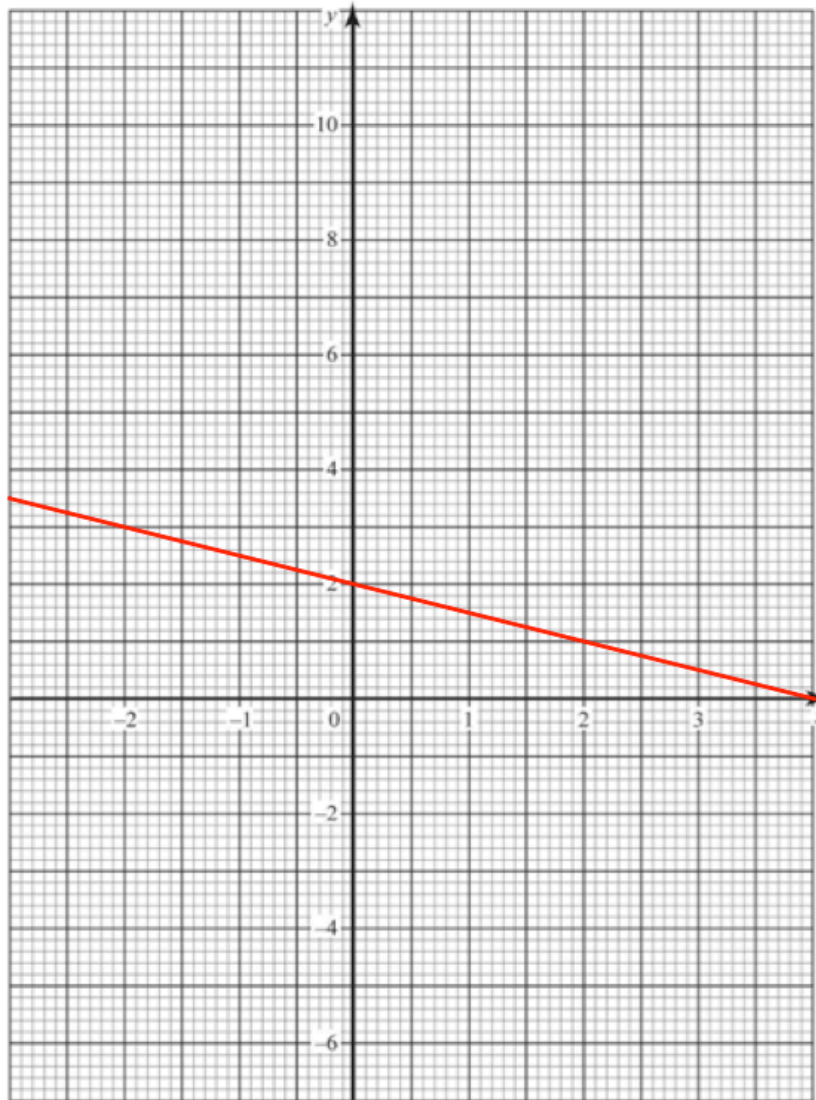
.....
(3)

The point P has coordinates $(-2, 9)$.

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

.....
(2)

72.



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)

73. Solve the simultaneous equations

$$2x + 4y = 26$$

$$3x - y = 4$$

Do not use trial and improvement

$$x = \dots\dots\dots y = \dots\dots\dots$$

(3)

74. Solve the simultaneous equations

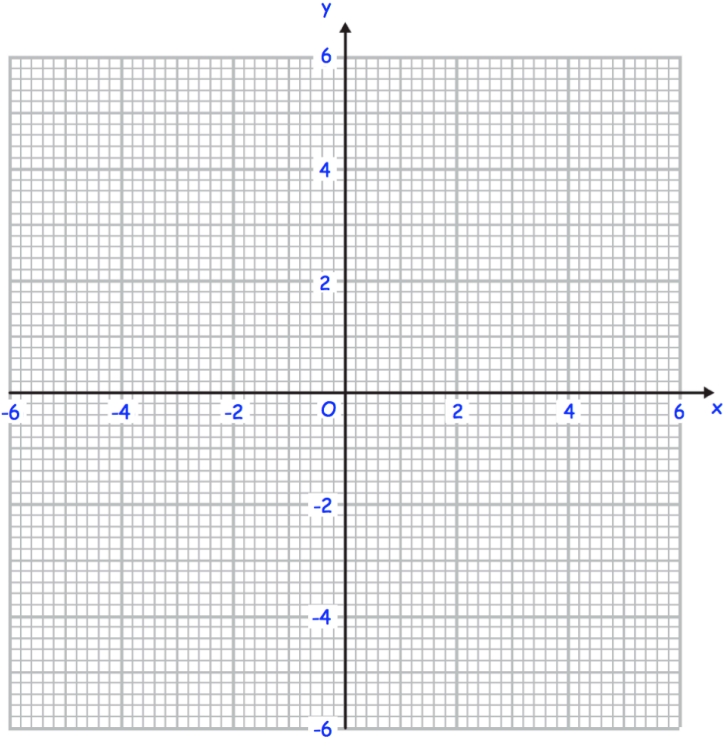
$$2x + y = 5$$

$$2x^2 + y^2 = 11$$

$$\dots\dots\dots$$

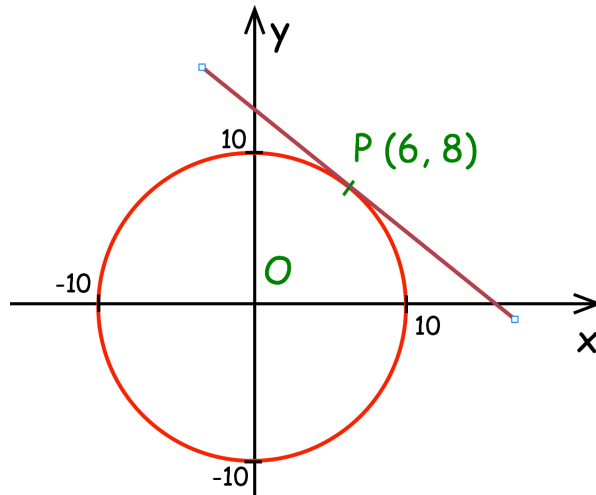
(4)

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



(2)

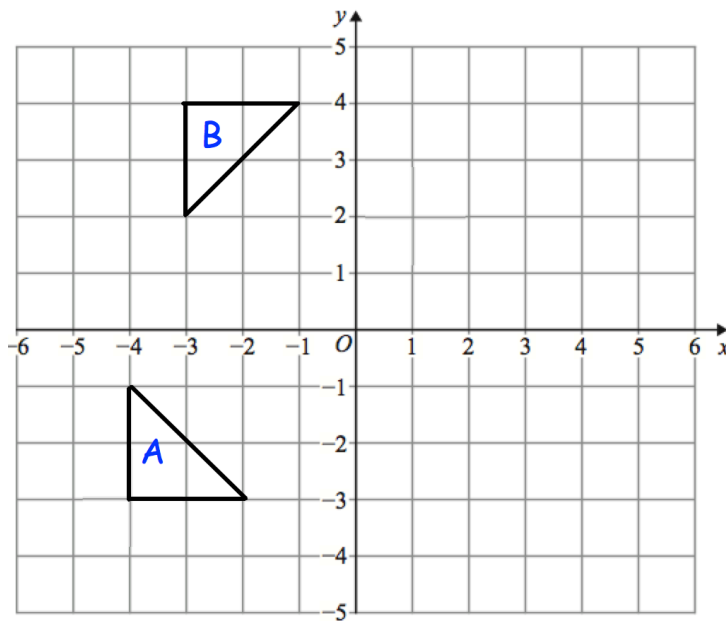
76. Here is a circle, centre O, and the tangent to the circle at the point (6, 8).



Find the equation of the tangent at the point P.

.....
(4)

77.



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

.....
.....

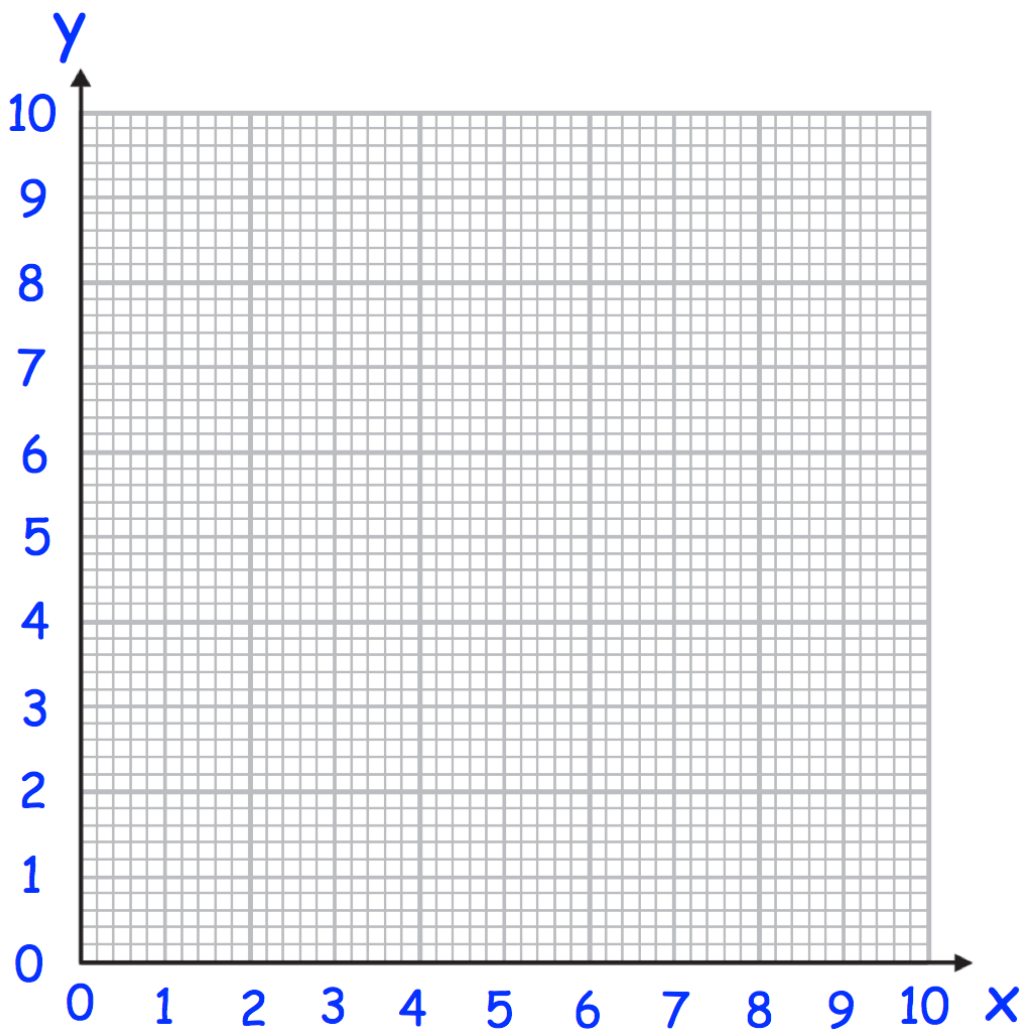
(2)

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

x	0.5	1	2	4	8	10
y						

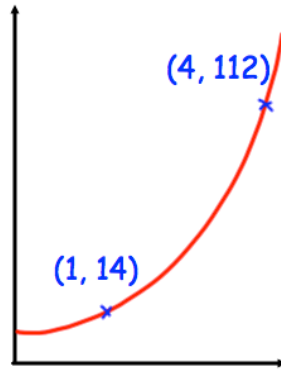
(2)

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



(2)

79.



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

$a = \dots\dots\dots$

$b = \dots\dots\dots$

(3)

80. S is a geometric sequence.

The first three terms of S are $(x + 18)$, x and $(2x - 15)$, where x is positive.

Find the value of x .

$\dots\dots\dots$
(3)

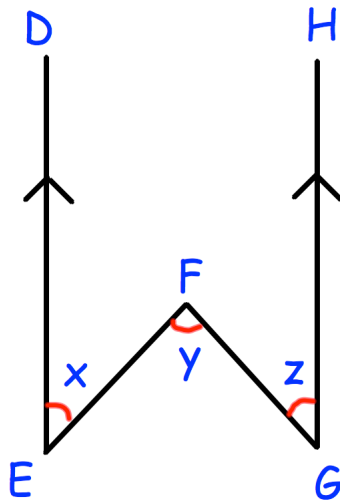
81. Solve the equation $x^2 - 2x - 9 = 0$

Give your answers to two decimal places.

$x = \dots\dots\dots$ Or $x = \dots\dots\dots$

(3)

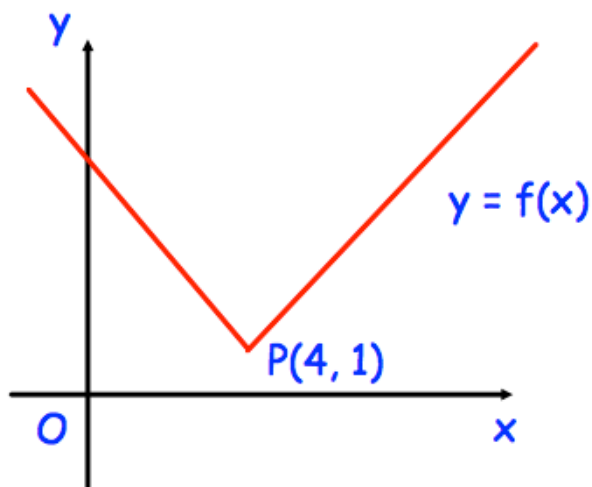
82. In the diagram below, the lines ED and GH are parallel.



Prove that $x + z = y$

(3)

83. 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) $y = f(-x)$

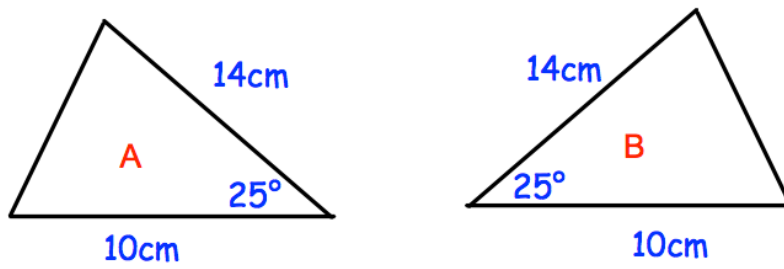
(..... ,)
(1)

(d) $y = f(x + 5)$

(..... ,)
(1)

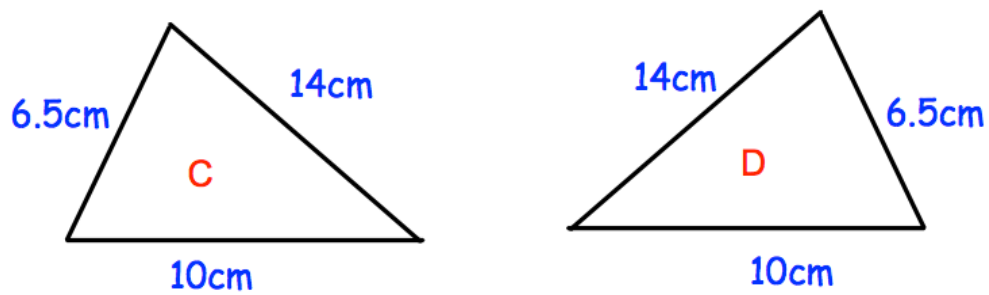
84. For each pair below, state the condition why they are congruent.

(a)



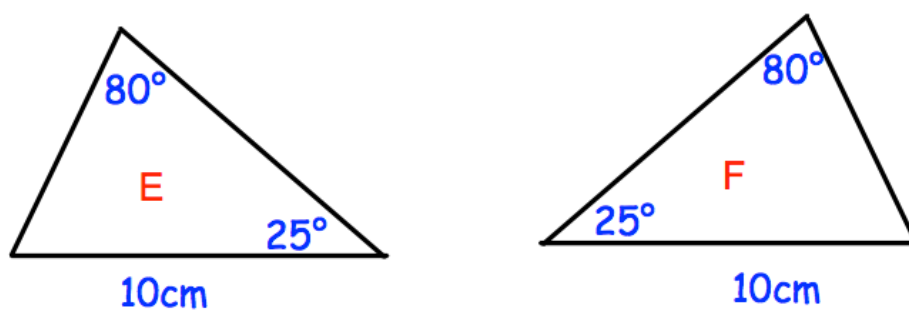
Condition:
(1)

(b)



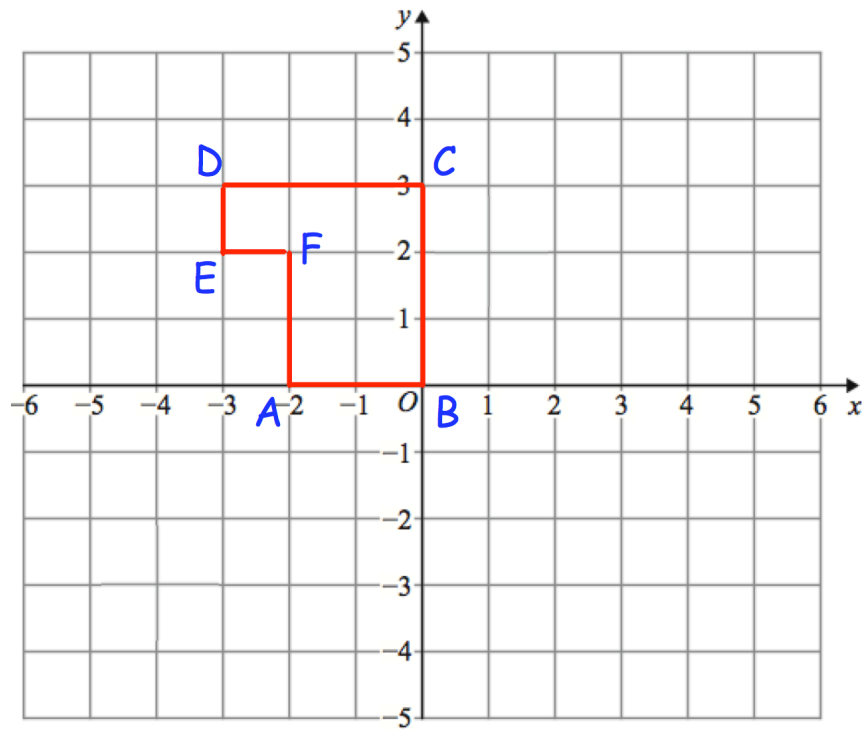
Condition:
(1)

(c)



Condition:
(1)

85. Here is shape ABCDEF



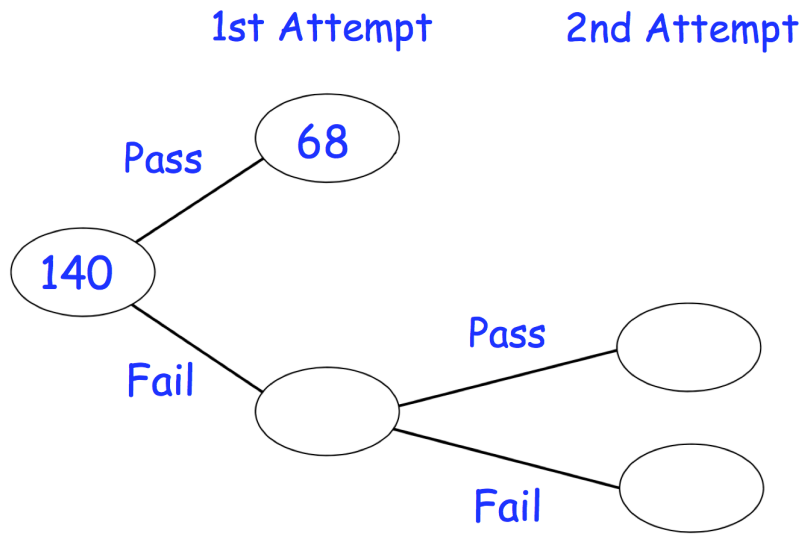
Describe fully a **single** transformation so that only vertex F is invariant.

.....

.....

.....

86. 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



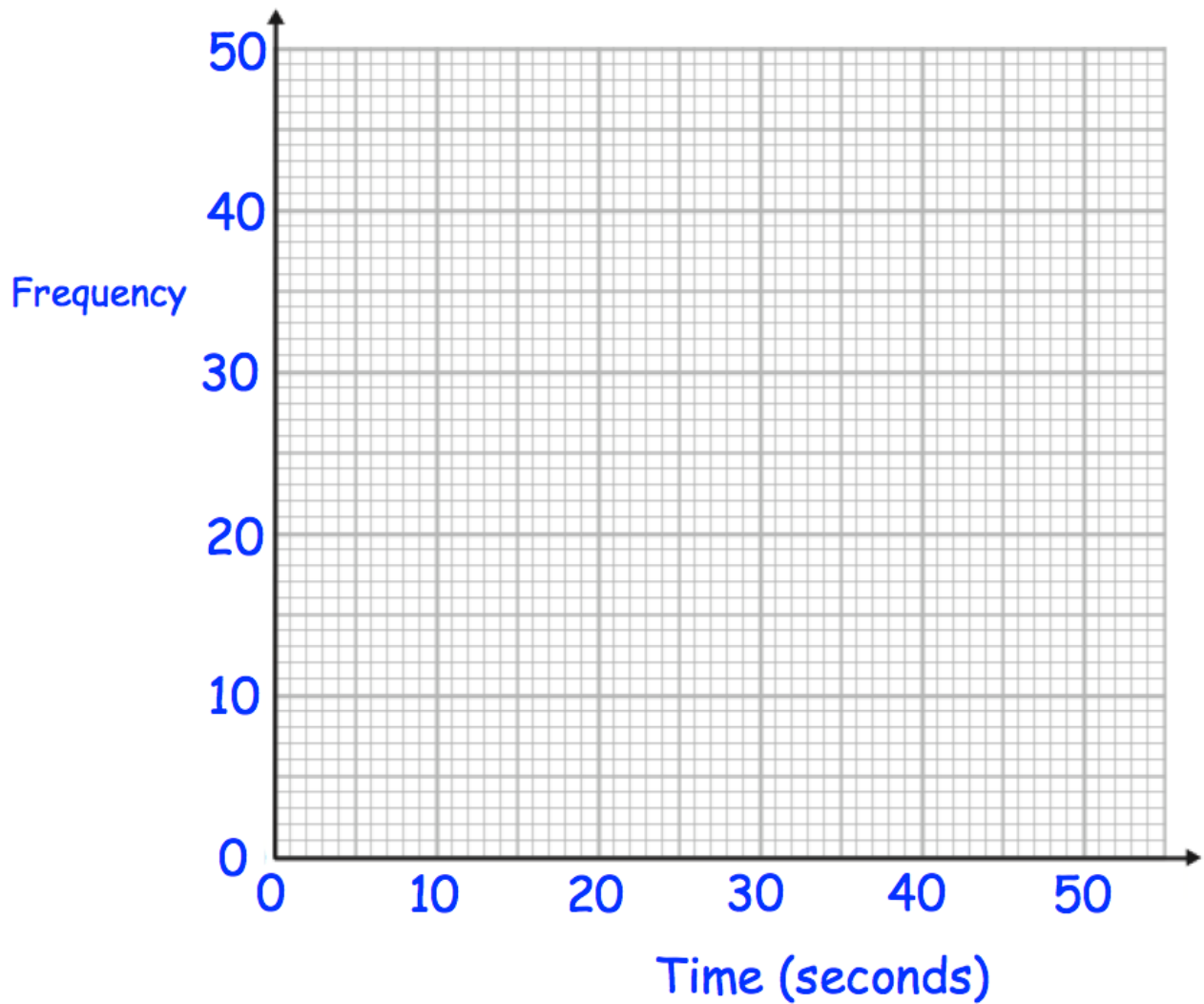
85% of the students receive a certificate.

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

87. The table gives information about the time taken, in seconds, for students to complete a puzzle.

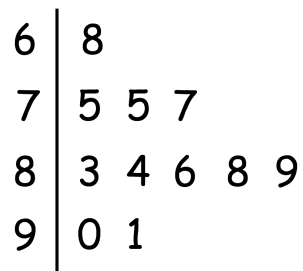
Time (seconds)	Frequency
$0 < t \leq 10$	7
$10 < t \leq 20$	25
$20 < t \leq 30$	38
$30 < t \leq 40$	16
$40 < t \leq 50$	12

Draw a frequency polygon for the information in the table.



88. The stem and leaf diagram shows information about the ratings of 11 footballers in a computer game.

Key: 6 | 8 means 68



- (a) How many of the footballers had a rating less than 85?

.....
(1)

- (b) Write down the mode.

.....
(1)

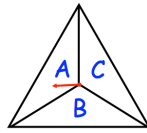
- (c) Work out the range of the ratings.

.....
(1)

- (d) Work out the median rating.

.....
(1)

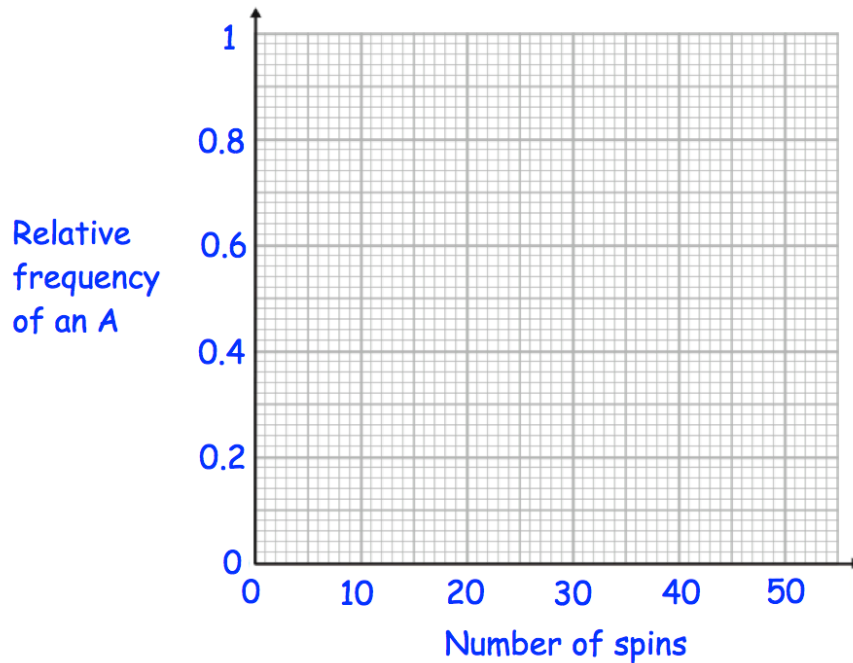
89. A three-sided spinner is labelled A, B and C.



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

(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

.....

.....

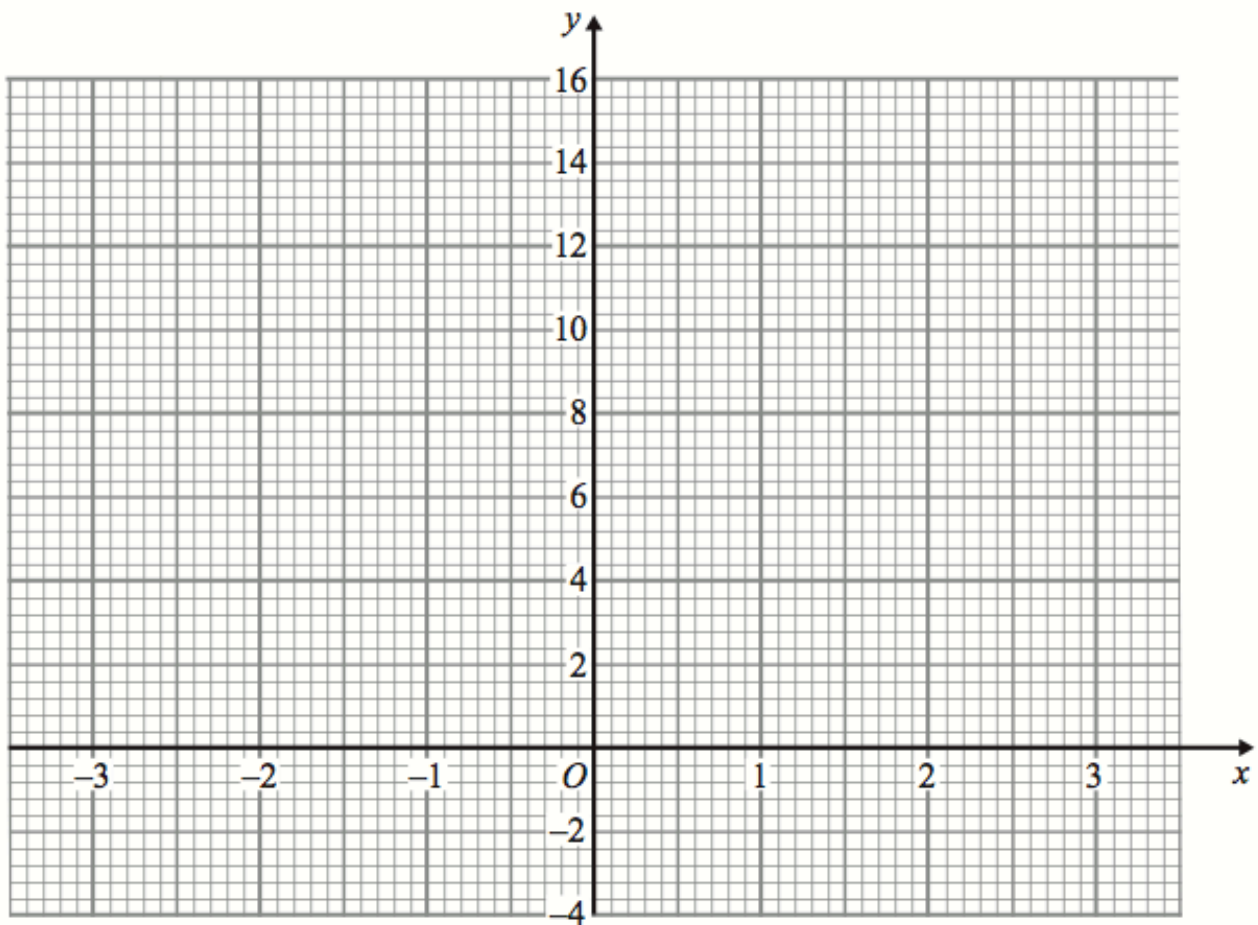
(2)

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

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

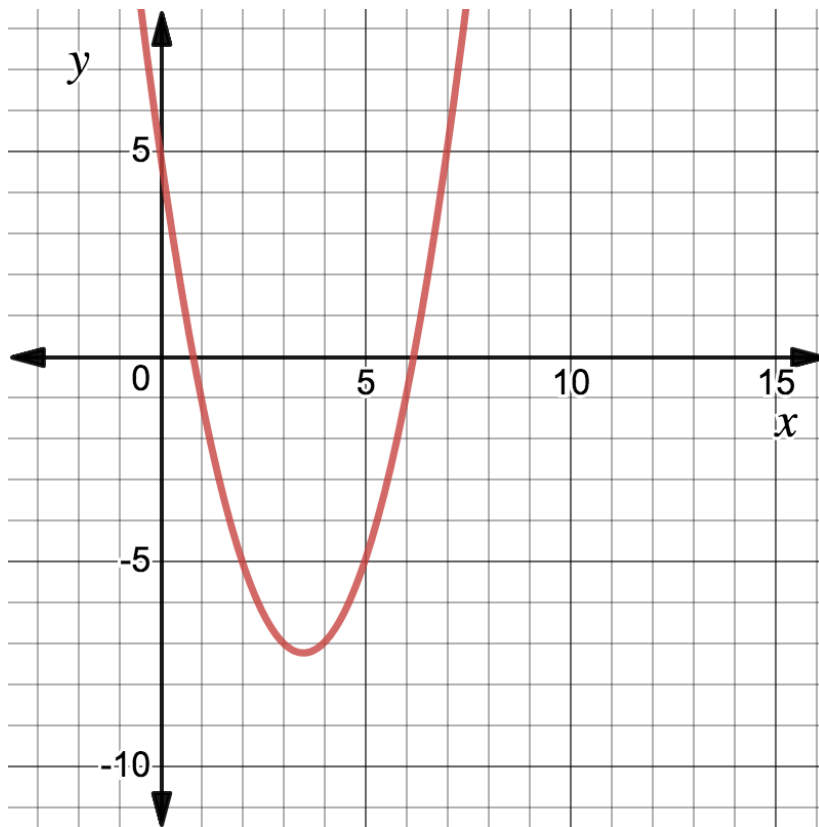
(2)

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



(2)

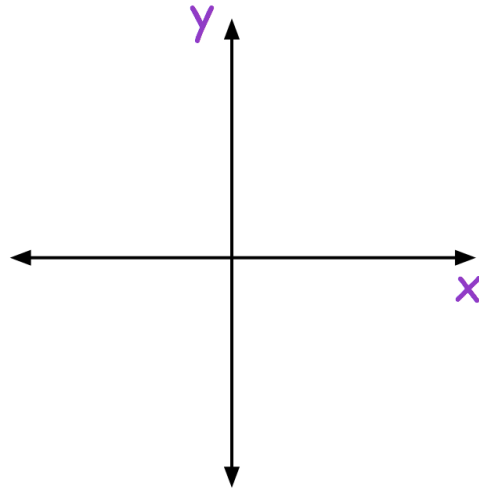
91. Shown below is the graph of $y = x^2 - 7x + 5$



Use the graph to find estimates of the solutions of the equation $x^2 - 7x + 5 = -3$

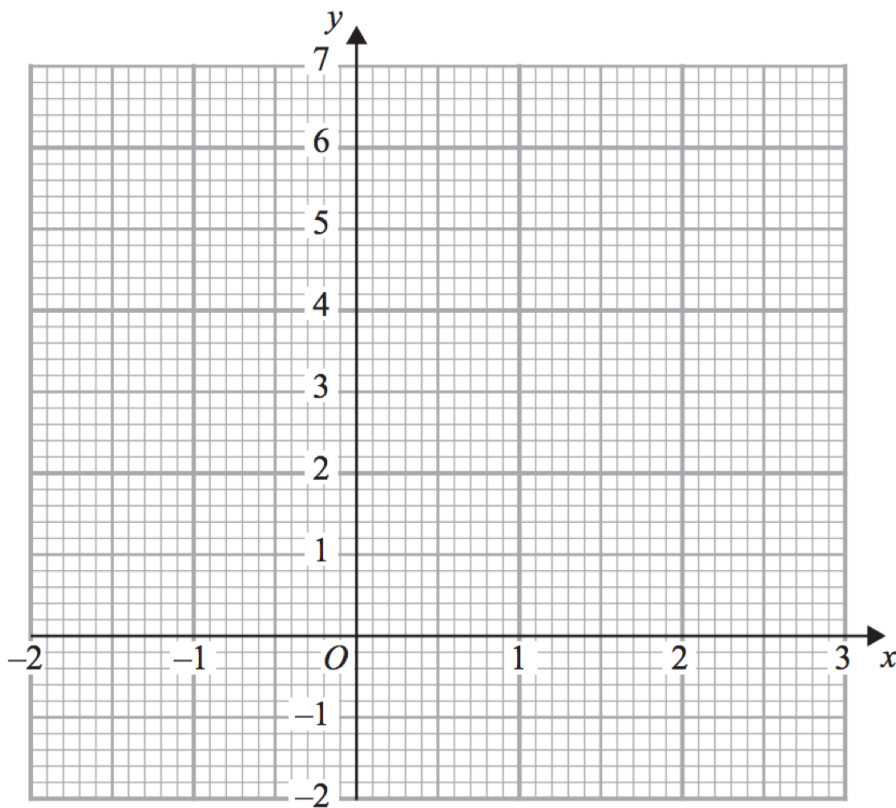
$x = \dots\dots\dots$ and $x = \dots\dots\dots$
(2)

92. Sketch the graph of $y = x^2 + 7x - 8$



(3)

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



(2)

94. The sum of the interior angles in a polygon is 7380°

Calculate the number of sides the polygon has.

.....
(2)

95. A biased coin is flipped twice.

The probability of the coin landing on tails is 0.7

Find the probability the coin lands on heads twice.

.....
(2)

96. There are 8 sweets in a bag.

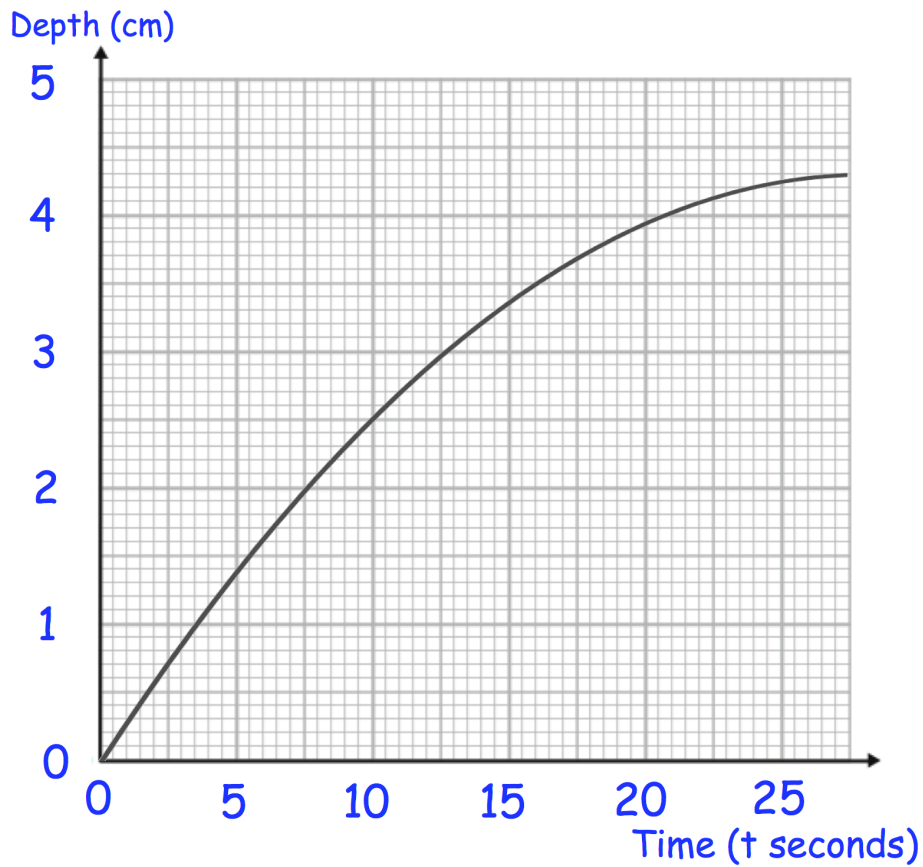
Three sweets are red, three sweets are blue and two sweets are green.

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

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

.....
(4)

97. 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)

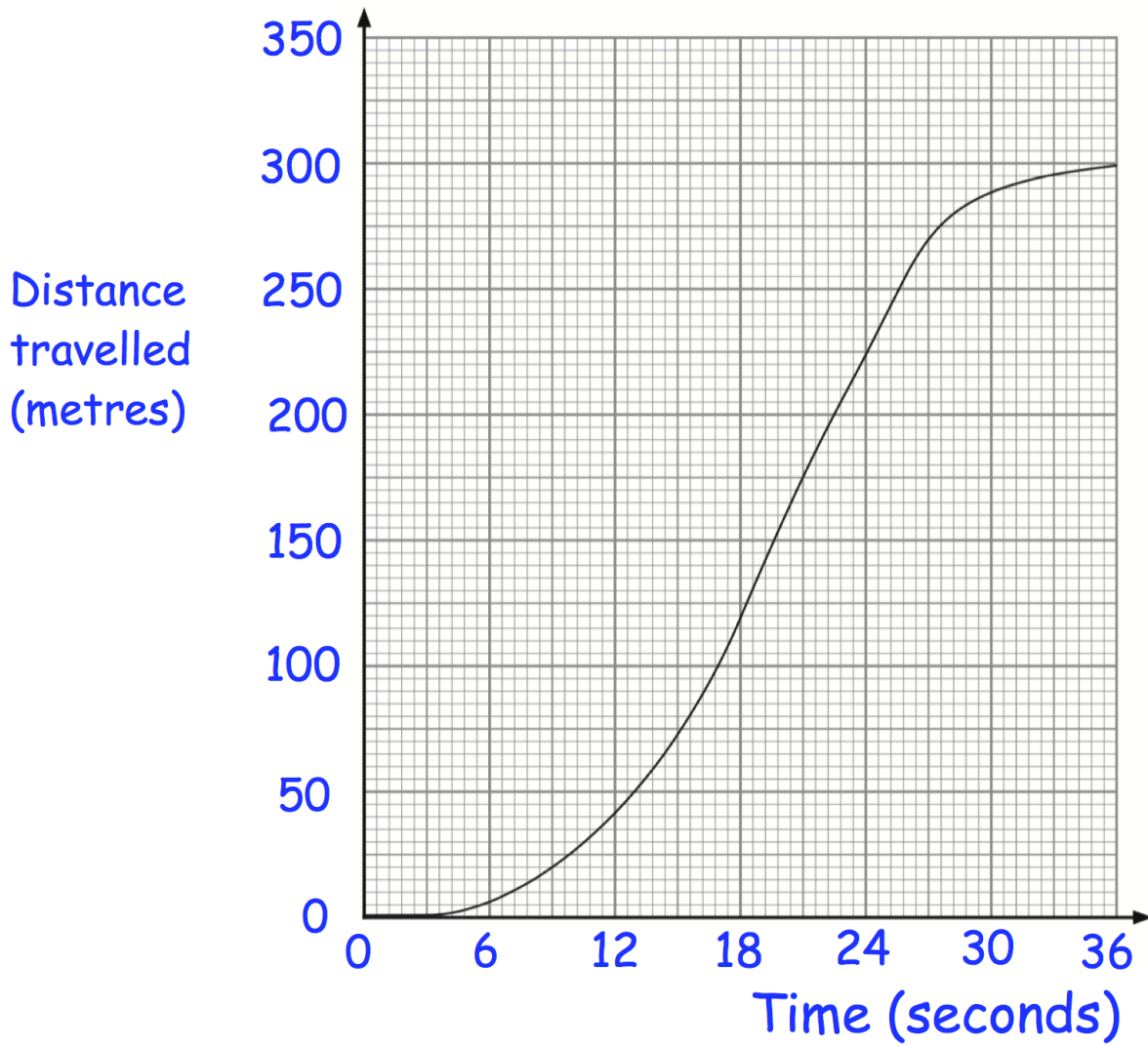
- (b) Describe fully what your answer to (a) represents

.....
.....
(2)

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

.....
(1)

98. The graph shows the distance travelled by a train over 36 seconds.

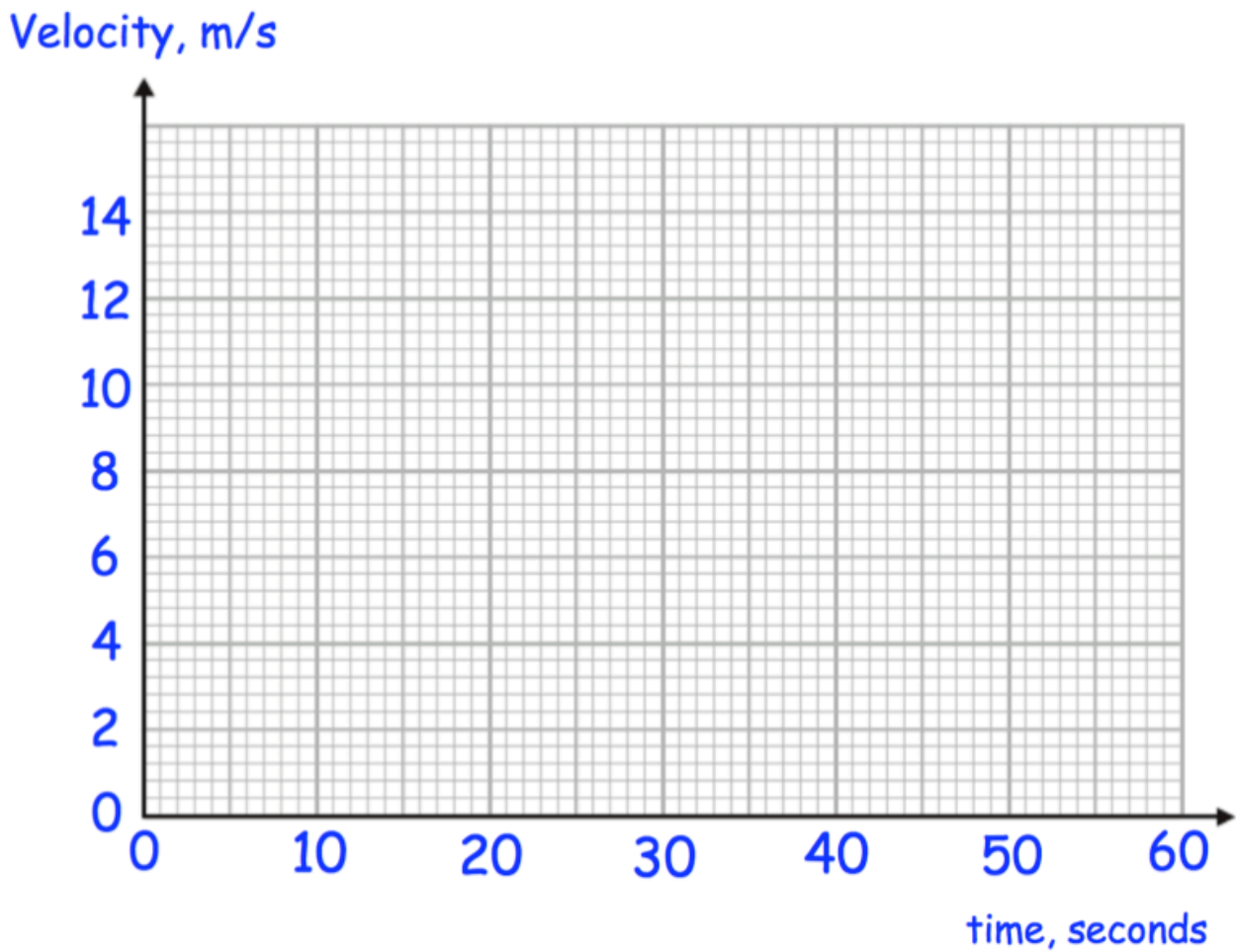


Work out the average speed of the train between 6 and 18 seconds.

.....m/s
(3)

99. 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)

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

$$f(x) = 5x - 1$$

$$g(x) = 2x + 4$$

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

.....
(2)

(b) Calculate the value of $ff(10)$

.....
(2)

101. The function f is such that $f(x) = 4x - 9$

(a) Solve $f(x) = 13$

.....
(2)

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

.....
(2)

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

(4)

103. Hannah is baking two cakes.

One cake needs $1\frac{1}{3}$ cups of milk.

Hannah has $1\frac{1}{4}$ cups of milk.

How much more milk does Hannah need?

.....cups

(3)

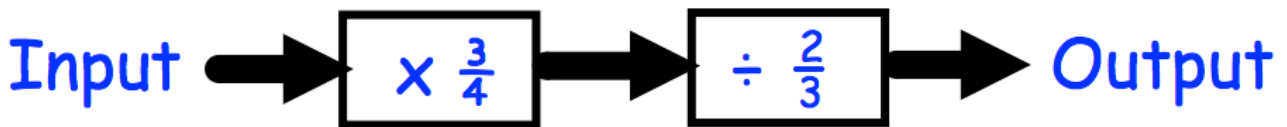
104. Work out

$$1\frac{1}{3} \times 2\frac{2}{5}$$

Give your answer as a mixed number.

.....
(3)

105.



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

.....
(3)

(b) Find the input, if the output is $\frac{1}{2}$

.....
(3)

106. Write down the reciprocal of 0.35

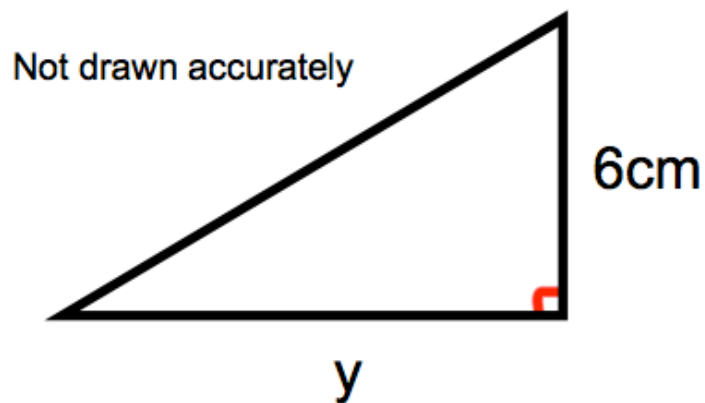
.....
(1)

107. x is an integer.

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

.....
(3)

108. Shown below is a right-angled triangle.

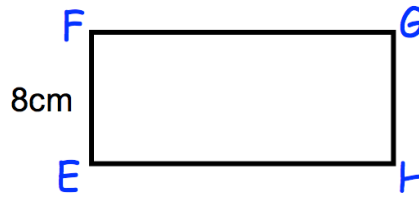
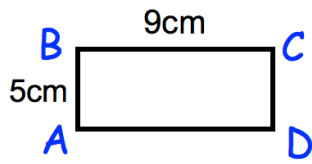


The area of the triangle is 21cm^2
Calculate y , the length of the base.

.....cm
(2)

109.

Not drawn accurately



Rectangles $ABCD$ and $EFGH$ are similar.

$$AB = 5\text{cm}$$

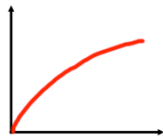
$$BC = 9\text{cm}$$

$$EF = 8\text{cm}$$

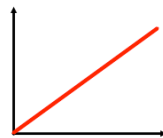
Work out the length of FG .

.....cm
(2)

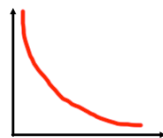
110. Match each graph to the correct relationship.



$$y \propto \frac{1}{x}$$



$$y \propto \sqrt{x}$$



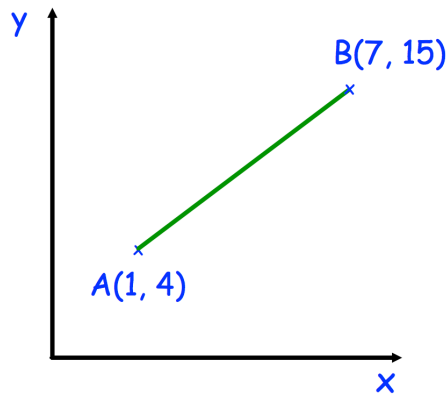
$$y \propto x$$

(3)

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

.....
(2)

112. Shown below are the points A(1, 4) and B(7, 15)



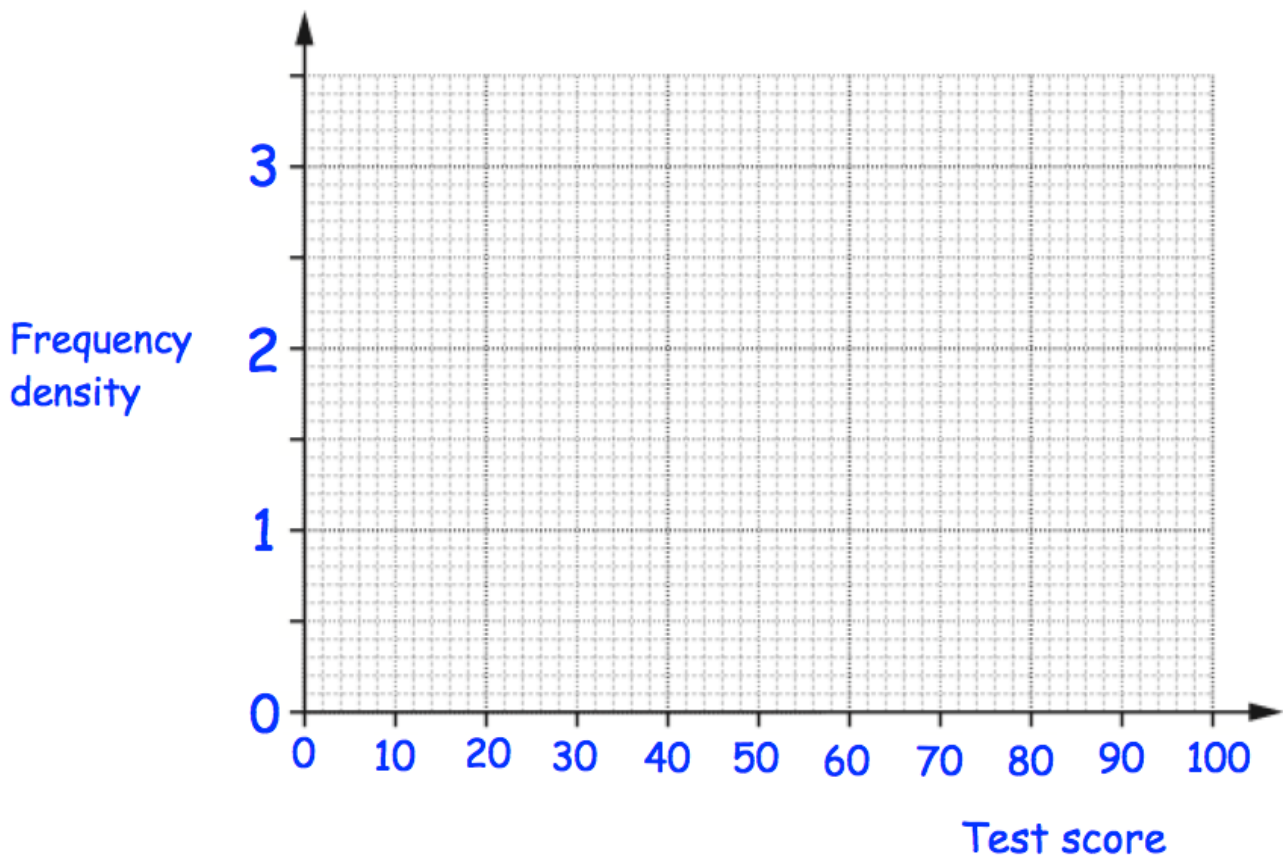
Calculate the length of the line joining A and B.

.....
(2)

113. The test scores from the students in a school are summarised in the table.

Test score, x	Frequency
$0 < x \leq 30$	15
$30 < x \leq 40$	22
$40 < x \leq 50$	28
$50 < x \leq 70$	30
$70 < x \leq 100$	9

Draw a histogram for this data.



(3)

114. Here are the ages of 11 friends.

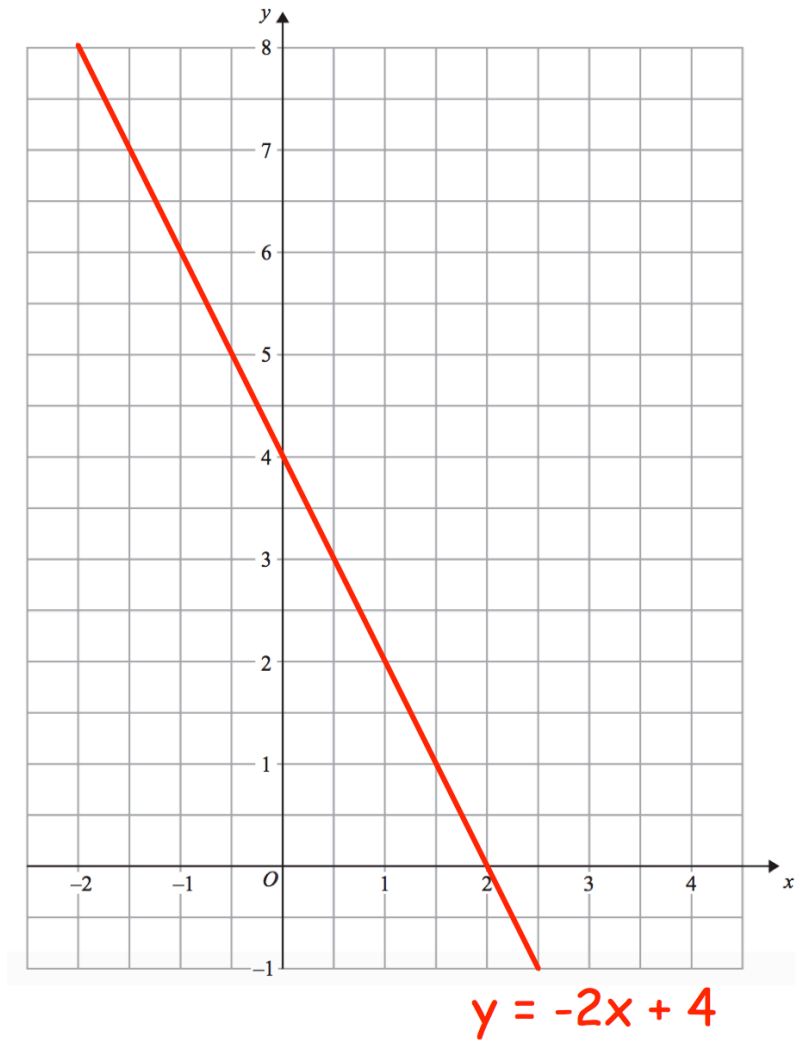
34 38 39 40 40 43 44 46 49 50 57

Work out the interquartile range of the ages.

.....
(2)

115.

The straight line $y = -2x + 4$ has been drawn on the grid.



(a) On the same grid, draw the graph of $y = x + 1$

(2)

(b) Use the graphs to solve the simultaneous equations

$$y = -2x + 4$$

$$y = x + 1$$

.....
(2)

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



Exchange Rates

\$ £ €

£1 : \$1.55
£1 : €1.24

*Commission Charged

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)

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

.....
(2)

118. Solve

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

.....
(5)

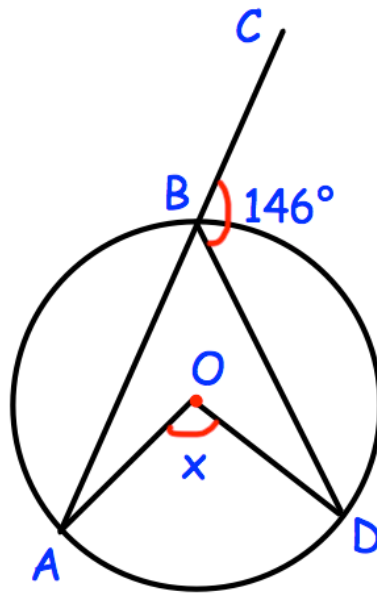
119. Here are the first 5 terms of a quadratic sequence

9 17 29 45 65

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

.....
(3)

120.



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

Find the size of angle AOD.

.....^o
(3)

121. (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)