

Y11 Homework Booklet TPS 6 (2020-2021)

1H Non-Calculator

	Score (80 per paper)	Top 3 Revision Targets
Paper 1		1.
		2.
		3.
Paper 2		1.
		2.
		3.
Paper 3		1.
		2.
		3.

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer ALL questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may not be used.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**



Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

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- Keep an eye on the time.
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- Check your answers if you have time at the end.

Q	Question Title	Score			Clip Number
1	Prime factorisation	/	2		30
2	Setting up and solving equations, writing a ratio	/	4		188, 328
3	Angles on parallel lines, angles in a triangle	/	4		483, 485, 481
4	Area of circles and rings	/	4		539, 543
5a	Mean from a grouped frequency table	/	3		418
5b	Choosing an appropriate average	/	1		413
6	Writing and solving equations	/	4		188, 184, 178
7	Drawing quadratic graphs	/	1		251
8	Comparing decimals	/	2		46, 53 (up to 2:34)
9	Speed problem solving	/	5		723
10a	Calculating unit fraction powers	/	1		108
10b	Calculating fractional powers	/	2		109
11	Set up and solve simultaneous equations	/	4		195
12a	Drawing a box plot	/	3		434
12b	Comparing box plots	/	2		436
13a	Proportion, fractions of amounts	/	2		77, 339
13b	Upper and lower bounds, simple probability	/	2		137, 351
14	Writing ratios in form n:1, rearranging formulae	/	3		331, 286
15	Converting recurring decimals into fraction	/	3		54
16	Algebraic direct proportion	/	3		344
17	Direct algebraic proof	/	2		326, 327
18	Enlargement with negative scale factor	/	2		646
19	Equations of perpendicular lines, finding points on a line	/	4		200, 210, 216
20	Exact values of cos, solving simultaneous equations	/	4		306, 195
21	Rationalising the denominator	/	3		119
22	Similar triangles	/	5		611
23	Set up and solve quadratic inequalities	/	5		277
Total		/	80		

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** Write 36 as a product of its prime factors.

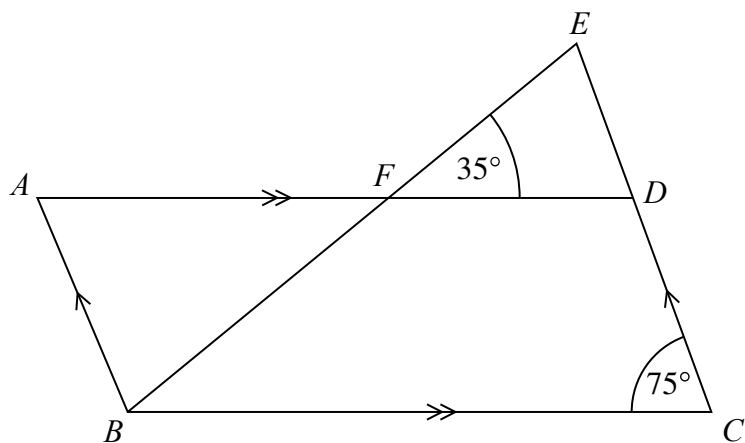
.....
(Total for Question 1 is 2 marks)

- 2 Kiaria is 7 years older than Jay.
 Martha is twice as old as Kiaria.
 The sum of their three ages is 77

Find the ratio of Jay's age to Kiaria's age to Martha's age.

.....
(Total for Question 2 is 4 marks)

3



$ABCD$ is a parallelogram.

EDC is a straight line.

F is the point on AD so that BFE is a straight line.

Angle $EFD = 35^\circ$

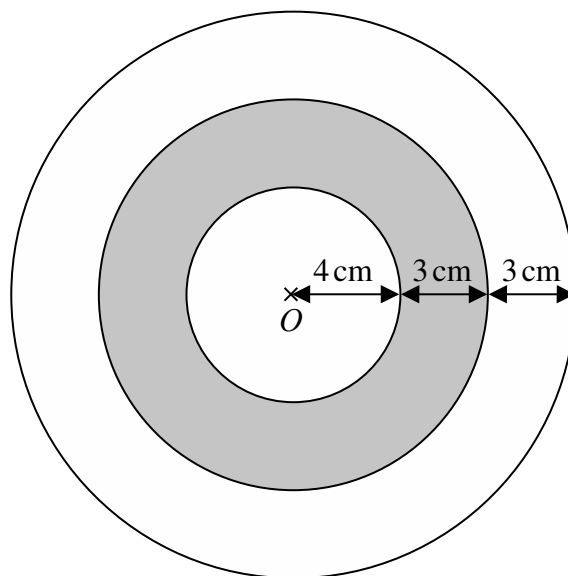
Angle $DCB = 75^\circ$

Show that angle $ABF = 70^\circ$

Give a reason for each stage of your working.

(Total for Question 3 is 4 marks)

- 4 The diagram shows a logo made from three circles.



Each circle has centre O .

Daisy says that exactly $\frac{1}{3}$ of the logo is shaded.

Is Daisy correct?

You must show all your working.

(Total for Question 4 is 4 marks)

5 The table shows information about the weekly earnings of 20 people who work in a shop.

Weekly earnings (£ x)	Frequency
$150 < x \leq 250$	1
$250 < x \leq 350$	11
$350 < x \leq 450$	5
$450 < x \leq 550$	0
$550 < x \leq 650$	3

(a) Work out an estimate for the mean of the weekly earnings.

£.....
(3)

Nadiya says,
 “The mean may **not** be the best average to use to represent this information.”

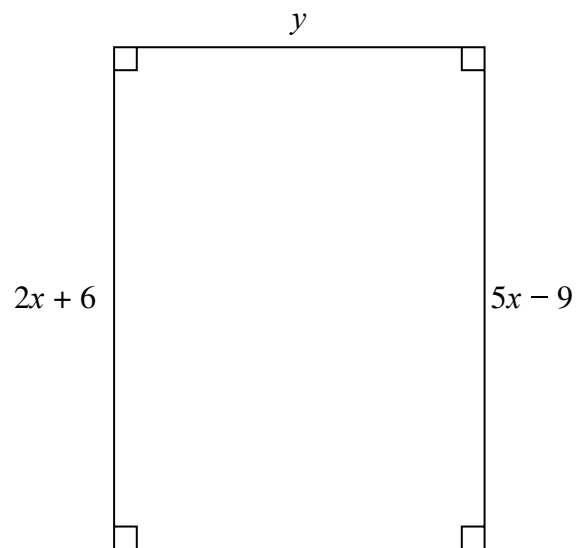
(b) Do you agree with Nadiya?
 You must justify your answer.

.....

 (1)

(Total for Question 5 is 4 marks)

- 6 Here is a rectangle.



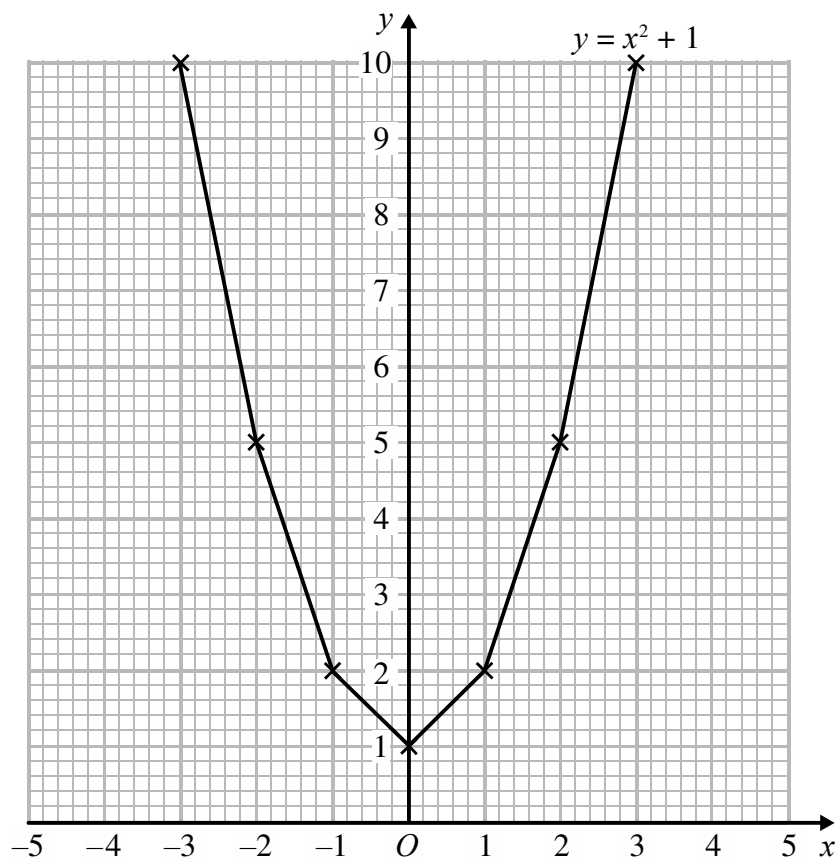
All measurements are in centimetres.

The area of the rectangle is 48 cm^2 .

Show that $y = 3$

(Total for Question 6 is 4 marks)

- 7 Brogan needs to draw the graph of $y = x^2 + 1$
Here is her graph.



Write down one thing that is wrong with Brogan's graph.

.....

.....

(Total for Question 7 is 1 mark)

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

$0.2\dot{4}\dot{6}$

$0.24\dot{6}$

$0.\dot{2}4\dot{6}$

0.246

.....
(Total for Question 8 is 2 marks)

- 9 James and Peter cycled along the same 50 km route.

James took $2\frac{1}{2}$ hours to cycle the 50 km.

Peter started to cycle 5 minutes after James started to cycle.

Peter caught up with James when they had both cycled 15 km.

James and Peter both cycled at constant speeds.

Work out Peter's speed.

..... km/h

(Total for Question 9 is 5 marks)

- 10** (a) Write down the value of $100^{\frac{1}{2}}$

.....
(1)

- (b) Find the value of $125^{\frac{2}{3}}$

.....
(2)

(Total for Question 10 is 3 marks)

- 11** 3 teas and 2 coffees have a total cost of £7.80.
5 teas and 4 coffees have a total cost of £14.20.

Work out the cost of one tea and the cost of one coffee.

tea £.....

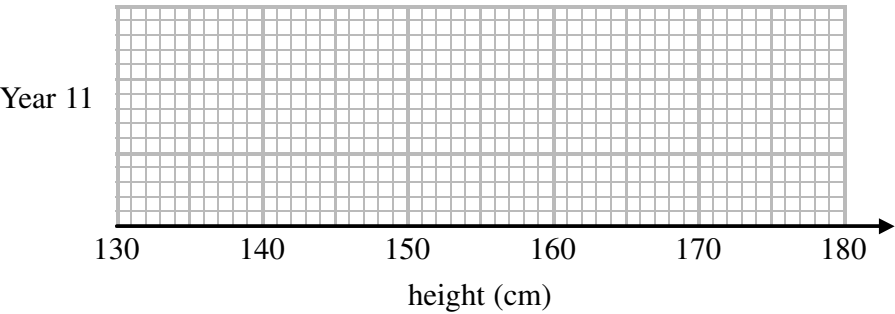
coffee £.....

(Total for Question 11 is 4 marks)

12 The table shows information about the heights, in cm, of a group of Year 11 girls.

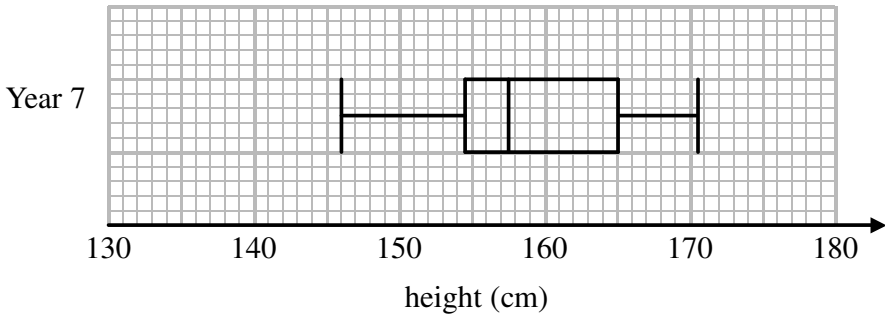
	height (cm)
least height	154
median	165
lower quartile	161
interquartile range	7
range	20

(a) Draw a box plot for this information.



(3)

The box plot below shows information about the heights, in cm, of a group of Year 7 girls.



(b) Compare the distribution of heights of the Year 7 girls with the distribution of heights of the Year 11 girls.

.....

.....

.....

.....

(2)

(Total for Question 12 is 5 marks)

13 A factory makes 450 pies every day.
The pies are chicken pies or steak pies.

Each day Milo takes a sample of 15 pies to check.

The proportion of the pies in his sample that are chicken is the same as the proportion of the pies made that day that are chicken.

On Monday Milo calculated that he needed exactly 4 chicken pies in his sample.

(a) Work out the total number of chicken pies that were made on Monday.

.....
(2)

On Tuesday, the number of steak pies Milo needs in his sample is 6 correct to the nearest whole number.

Milo takes at random a pie from the 450 pies made on Tuesday.

(b) Work out the lower bound of the probability that the pie is a steak pie.

.....
(2)

(Total for Question 13 is 4 marks)

- 14** The ratio $(y + x) : (y - x)$ is equivalent to $k : 1$

Show that $y = \frac{x(k+1)}{k-1}$

(Total for Question 14 is 3 marks)

- 15** $x = 0.4\dot{3}\dot{6}$

Prove algebraically that x can be written as $\frac{24}{55}$

(Total for Question 15 is 3 marks)

16 y is directly proportional to $\sqrt[3]{x}$

$$y = 1\frac{1}{6} \text{ when } x = 8$$

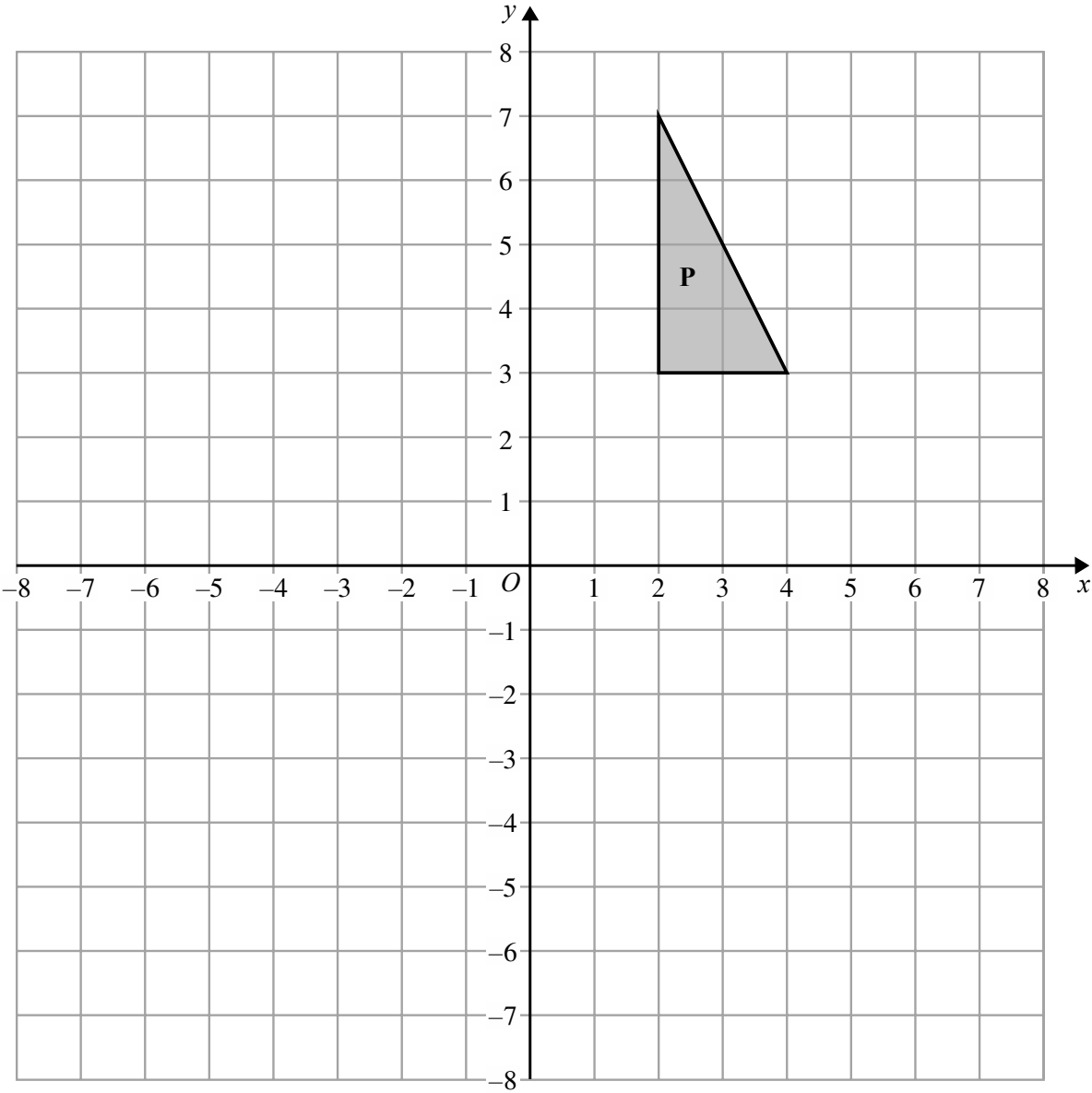
Find the value of y when $x = 64$

.....
(Total for Question 16 is 3 marks)

17 n is an integer.

Prove algebraically that the sum of $\frac{1}{2}n(n+1)$ and $\frac{1}{2}(n+1)(n+2)$ is always a square number.

(Total for Question 17 is 2 marks)

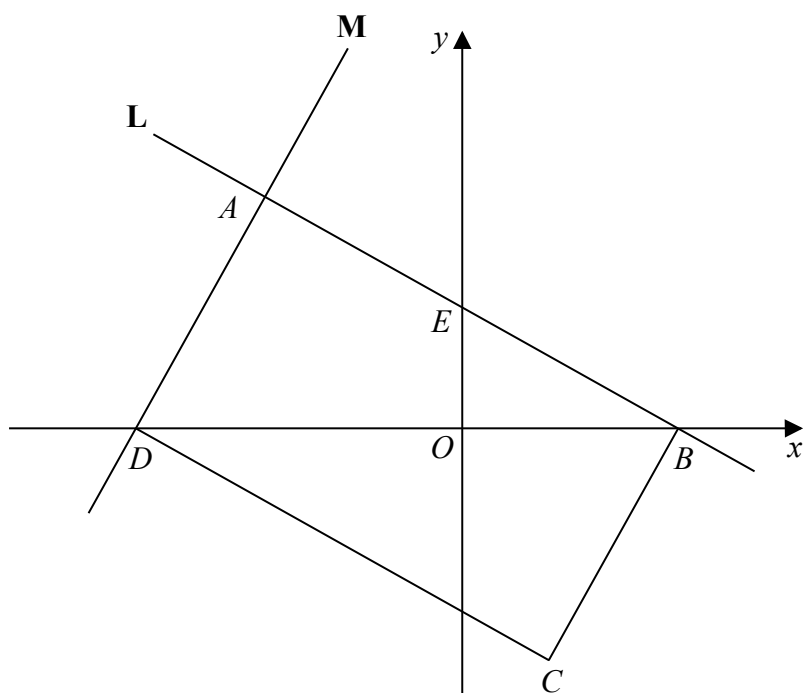


Enlarge shape **P** by scale factor $\frac{1}{2}$ with centre of enlargement (0, 0).

Label your image **Q**.

(Total for Question 18 is 2 marks)

19



$ABCD$ is a rectangle.

A , E and B are points on the straight line L with equation $x + 2y = 12$

A and D are points on the straight line M .

$$AE = EB$$

Find an equation for M .

.....
(Total for Question 19 is 4 marks)

20 The table shows some values of x and y that satisfy the equation $y = a \cos x^\circ + b$

x	0	30	60	90	120	150	180
y	3	$1 + \sqrt{3}$	2	1	0	$1 - \sqrt{3}$	-1

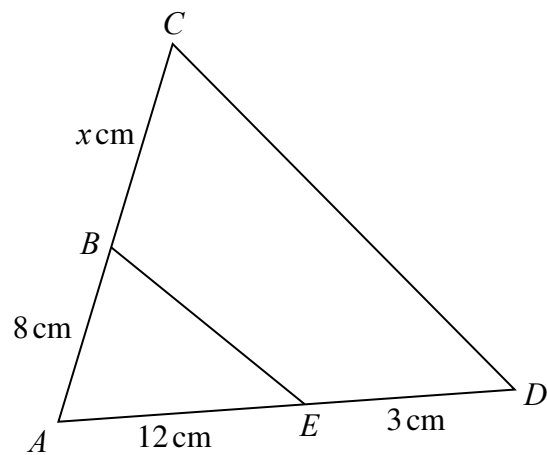
Find the value of y when $x = 45$

.....
(Total for Question 20 is 4 marks)

21 Show that $\frac{6}{\sqrt{2}} - \frac{\sqrt{8}}{1}$ can be written in the form $a + b\sqrt{2}$ where a and b are integers.

(Total for Question 21 is 3 marks)

- 22 The two triangles in the diagram are similar.



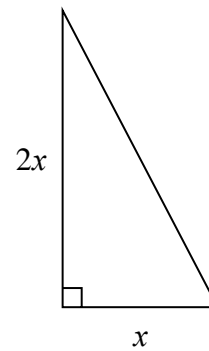
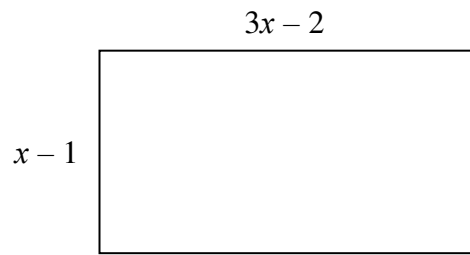
There are two possible values of x .

Work out each of these values.

State any assumptions you make in your working.

(Total for Question 22 is 5 marks)

- 23 Here is a rectangle and a right-angled triangle.



All measurements are in centimetres.

The area of the rectangle is greater than the area of the triangle.

Find the set of possible values of x .

.....
(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

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1	Solve equations with x on both sides	/	3	185
2	Percentage profit	/	3	760
3a	Circumference	/	2	534
3b	Mean	/	1	405
4	Ratio and probability	/	3	328, 330, 351
5a	Rotate a shape around the origin	/	1	648
5b	Translate a shape using a vector	/	1	638
6a	Indices with algebraic expressions	/	1	174
6b	Indices with algebraic expressions	/	1	174
6c	Manipulating powers	/	2	793
7	Pythagoras' theorem, right-angled trigonometry	/	5	499, 512, 514
8a	Complex calculations with a calculator	/	2	129
8b	Rounding to 2 decimal places	/	1	56
9	Inverse proportion	/	3	342
10a	Distance-time graphs - interpreting	/	2	877
10b	Distance-time graphs - calculating speed	/	1	877
11	Interpreting pie charts, ratio and proportion	/	3	330, 429, 539
12	Interior angles in a polygon, angles in an isosceles triangle	/	3	562, 486
13a	Compound interest, exponential growth	/	2	94, 805
13b	Exponential growth	/	3	806
14	Linear inequalities as graph regions	/	3	275
15a	Product rule for counting	/	1	671
15b	Product rule for counting	/	2	673
16	Solving equations by completing the square	/	2	238
17a	Drawing a histogram	/	3	446
17b	Interpreting a histogram	/	2	447
18	Recurrence relation, percentage/decimal multiplier	/	1	262, 89
19	Calculating gradient, gradient of parallel lines	/	4	200, 203, 214
20	Circle theorems, trigonometry, area of a sector, area of a triangle	/	5	599, 600, 509, 546, 557
21a	Conditional probability	/	2	365
21b	Conditional probability	/	2	365
22	Functions, simultaneous equations	/	5	288, 295, 191
23a	Geometric sequences, expand brackets with surds, solving an equation	/	3	264, 116
23b	Geometric sequences, expand brackets with surds	/	2	264, 116
Total		/	80	

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Solve $5x - 6 = 3(x - 1)$

$x = \dots\dots\dots$

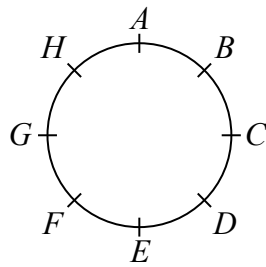
(Total for Question 1 is 3 marks)

- 2** Emily buys a pack of 12 bottles of water.
The pack costs £5.64.
Emily sells all 12 bottles for 50p each.
Work out Emily's percentage profit.
Give your answer correct to 1 decimal place.

$\dots\dots\dots\%$

(Total for Question 2 is 3 marks)

3 Hasmeet walks once round a circle with diameter 80 metres.

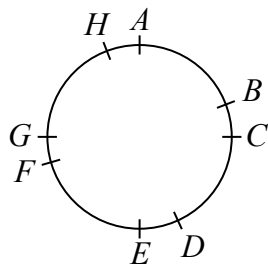


There are 8 points equally spaced on the circumference of the circle.

(a) Find the distance Hasmeet walks between one point and the next point.

.....m
(2)

Four of the points are moved, as shown in the diagram below.



Hasmeet walks once round the circle again.

(b) Has the mean distance that Hasmeet walks between one point and the next point changed?

You must give a reason for your answer.

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

(Total for Question 3 is 3 marks)

4 There are only blue cubes, yellow cubes and green cubes in a bag.

There are

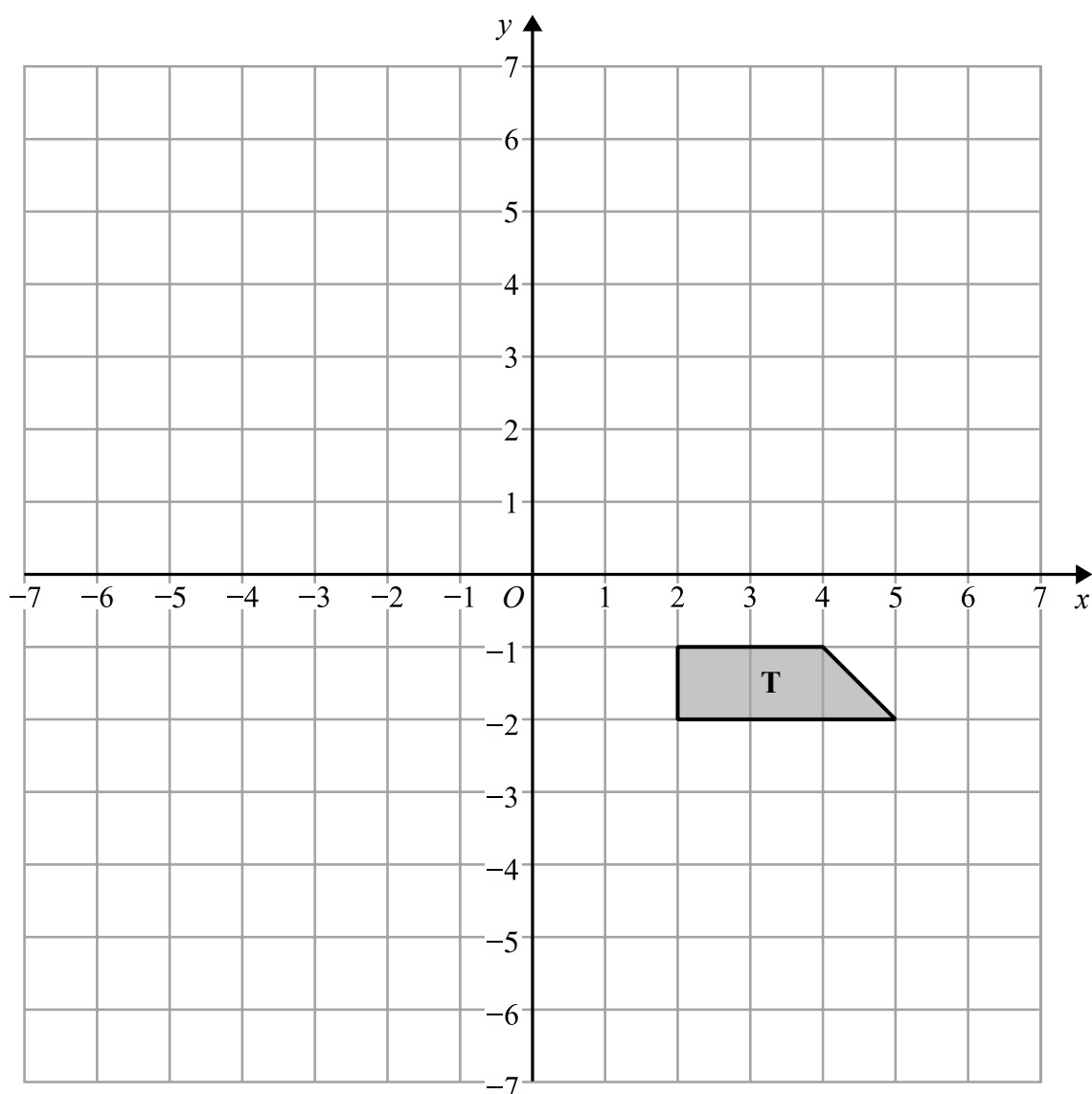
twice as many blue cubes as yellow cubes
and four times as many green cubes as blue cubes.

Hannah takes at random a cube from the bag.

Work out the probability that Hannah takes a yellow cube.

.....
(Total for Question 4 is 3 marks)

5



- (a) Rotate trapezium **T** 180° about the origin.
Label the new trapezium **A**.

(1)

- (b) Translate trapezium **T** by the vector $\begin{pmatrix} 1 \\ 3 \end{pmatrix}$

Label the new trapezium **B**.

(1)

(Total for Question 5 is 2 marks)

6 $p^3 \times p^x = p^9$

(a) Find the value of x .

$$x = \dots\dots\dots \quad \mathbf{(1)}$$

$$(7^2)^y = 7^{10}$$

(b) Find the value of y .

$$y = \dots\dots\dots \quad \mathbf{(1)}$$

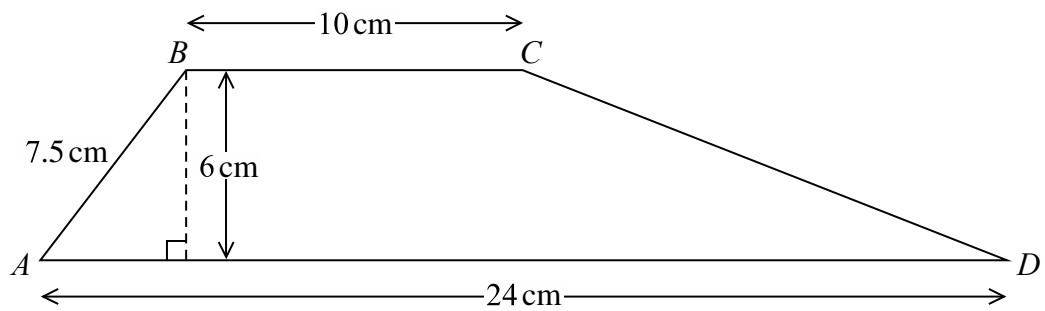
$100^a \times 1000^b$ can be written in the form 10^w

(c) Show that $w = 2a + 3b$

(2)

(Total for Question 6 is 4 marks)

- 7 $ABCD$ is a trapezium.



Work out the size of angle CDA .
Give your answer correct to 1 decimal place.

.....^o
(Total for Question 7 is 5 marks)

8 Use your calculator to work out $\sqrt{\frac{\sin 25^\circ + \sin 40^\circ}{\cos 25^\circ - \cos 40^\circ}}$

(a) Write down all the figures on your calculator display.

.....
(2)

(b) Write your answer to part (a) correct to 2 decimal places.

.....
(1)

(Total for Question 8 is 3 marks)

9 Yesterday it took 5 cleaners $4\frac{1}{2}$ hours to clean all the rooms in a hotel.

There are only 3 cleaners to clean all the rooms in the hotel today.

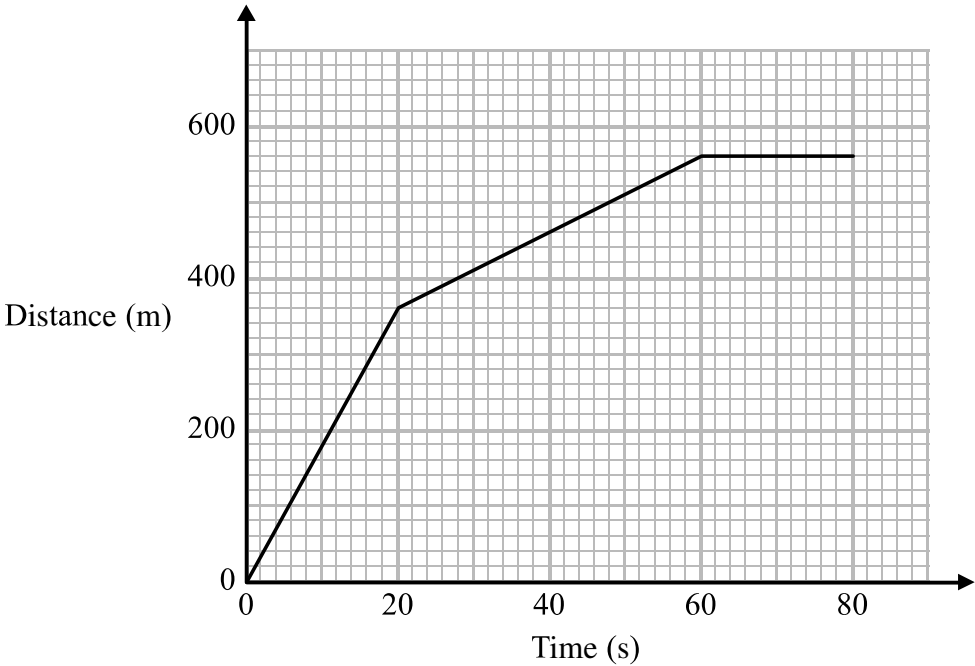
Each cleaner is paid £8.20 for each hour or part of an hour they work.

How much will each cleaner be paid today?

£

(Total for Question 9 is 3 marks)

10 Here is part of a distance-time graph for a car's journey.



- (a) Between which two times does the car travel at its greatest speed?
Give a reason for your answer.

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

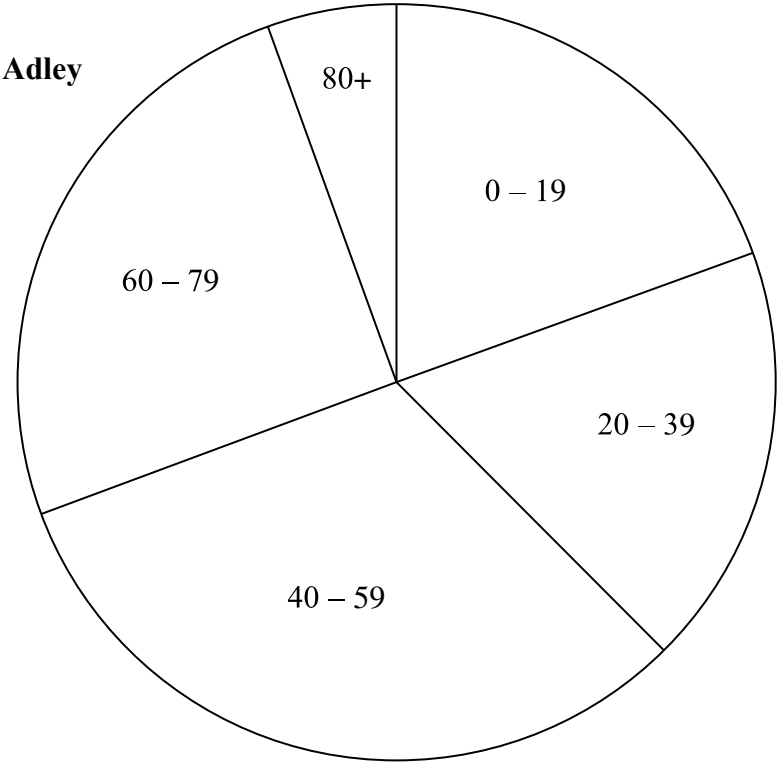
- (b) Work out this greatest speed.

..... m/s
(1)

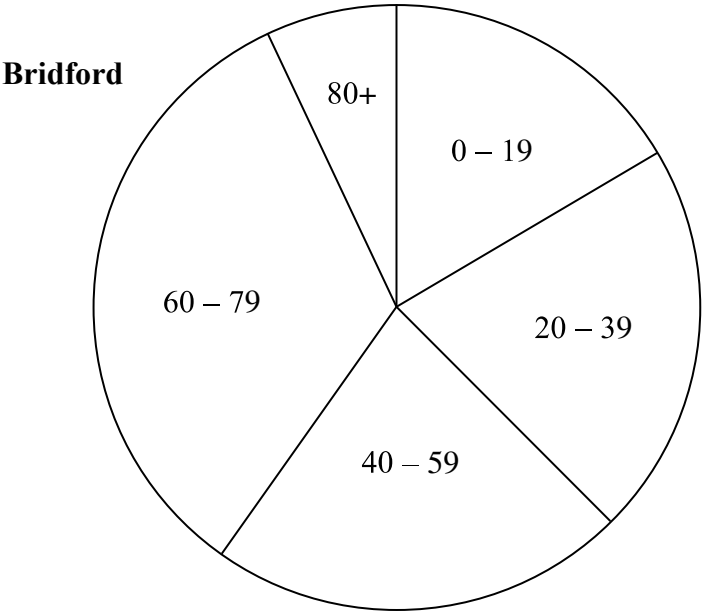
(Total for Question 10 is 3 marks)

.....

- 11** The pie chart gives information about the ages, in years, of people living in two towns, Adley and Bridford.



Diagrams
accurately
drawn



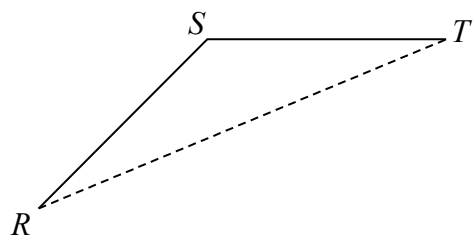
The ratio of the number of people living in Adley to the number of people living in Bridford is given by the ratio of the areas of the pie charts.

What proportion of the total number of people living in these two towns live in Adley **and** are aged 0 – 19?

Give your answer correct to 3 significant figures.

.....
(Total for Question 11 is 3 marks)

12



RS and ST are 2 sides of a regular 12-sided polygon.
 RT is a diagonal of the polygon.

Work out the size of angle STR .
You must show your working.

..... °

(Total for Question 12 is 3 marks)

- 13** At the beginning of 2009, Mr Veale bought a company.
The value of the company was £50 000.

Each year the value of the company increased by 2%.

- (a) Calculate the value of the company at the beginning of 2017.
Give your answer correct to the nearest £100.

£.....
(2)

At the beginning of 2009 the value of a different company was £250 000.
In 6 years the value of this company increased to £325 000.

This is equivalent to an increase of $x\%$ each year.

- (b) Find the value of x .
Give your answer correct to 2 significant figures.

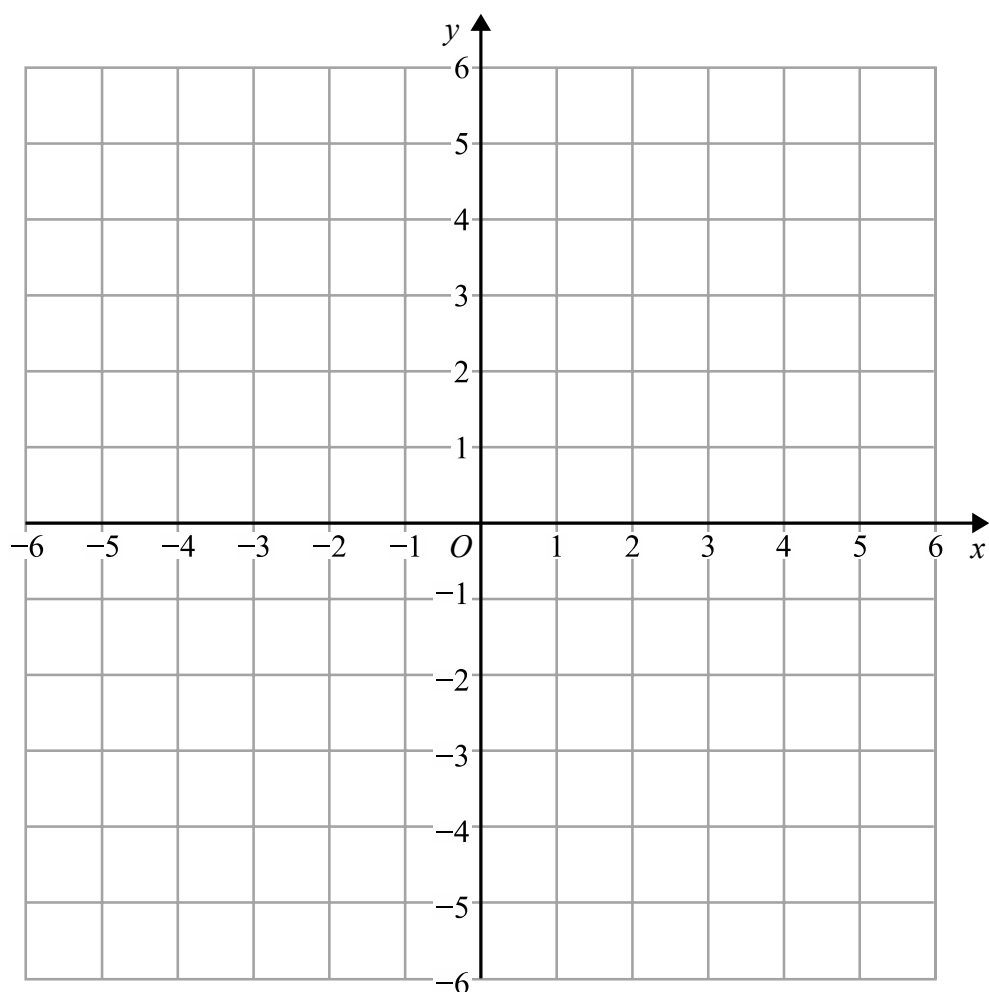
.....
(3)

(Total for Question 13 is 5 marks)

- 14** On the grid, shade the region that satisfies all these inequalities.

$$y > 1 \qquad x + y < 5 \qquad y > 2x$$

Label the region **R**.



(Total for Question 14 is 3 marks)

- 15** Tracey is going to choose a main course and a dessert in a cafe.
She can choose from 8 main courses and 7 desserts.

Tracey says that to work out the number of different ways of choosing a main course and a dessert you add 8 and 7.

- (a) Is Tracey correct?
You must give a reason for your answer.

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

12 teams play in a competition.
Each team plays each other team exactly once.

- (b) Work out the total number of games played.

.....
(2)

(Total for Question 15 is 3 marks)

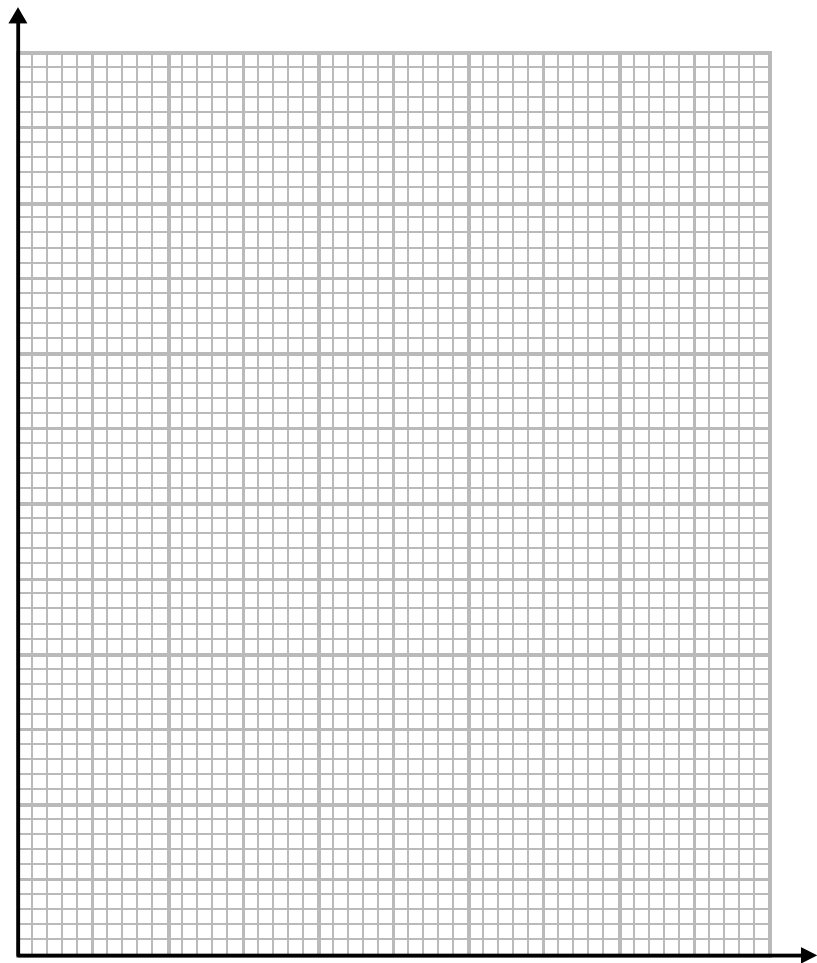
-
- 16** Solve $(x - 2)^2 = 3$
Give your solutions correct to 3 significant figures.

.....
(Total for Question 16 is 2 marks)

17 The table gives information about the heights of 150 students.

Height (h cm)	Frequency
$140 < h \leq 150$	15
$150 < h \leq 155$	30
$155 < h \leq 160$	51
$160 < h \leq 165$	36
$165 < h \leq 180$	18

(a) On the grid, draw a histogram for this information.



(3)

(b) Work out an estimate for the fraction of the students who have a height between 150 cm and 170 cm.

.....

(2)

(Total for Question 17 is 5 marks)

18 At time $t = 0$ hours a tank is full of water.

Water leaks from the tank.

At the end of every hour there is 2% less water in the tank than at the start of the hour.

The volume of water, in litres, in the tank at time t hours is V_t

Given that

$$V_0 = 2000$$

$$V_{t+1} = kV_t$$

write down the value of k .

$k = \dots\dots\dots$

(Total for Question 18 is 1 mark)

19 A triangle has vertices P , Q and R .

The coordinates of P are $(-3, -6)$

The coordinates of Q are $(1, 4)$

The coordinates of R are $(5, -2)$

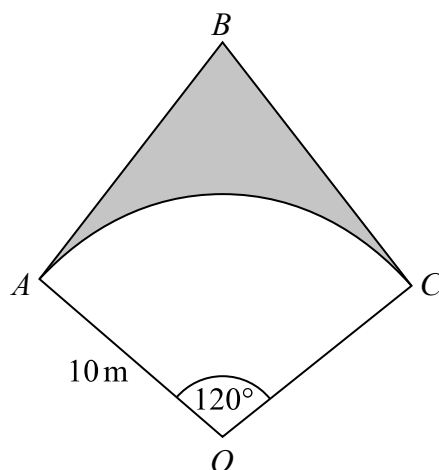
M is the midpoint of PQ .

N is the midpoint of QR .

Prove that MN is parallel to PR .

You must show each stage of your working.

(Total for Question 19 is 4 marks)



OAC is a sector of a circle, centre O , radius 10 m.

BA is the tangent to the circle at point A .

BC is the tangent to the circle at point C .

Angle $AOC = 120^\circ$

Calculate the area of the shaded region.

Give your answer correct to 3 significant figures.

.....m²

(Total for Question 20 is 5 marks)

- 21** There are 12 counters in a bag.
There is an equal number of red counters, blue counters and yellow counters in the bag.
There are no other counters in the bag.
3 counters are taken at random from the bag.
(a) Work out the probability of taking 3 red counters.

.....
(2)

- The 3 counters are put back into the bag.
Some more counters are now put into the bag.
There is still an equal number of red counters, blue counters and yellow counters in the bag.
There are no counters of any other colour in the bag.
3 counters are taken at random from the bag.
(b) It is now less likely or equally likely or more likely that the 3 counters will be red?
You must show how you get your answer.

(2)

(Total for Question 21 is 4 marks)

22 The function f and g are such that

$$f(x) = 5x + 3 \quad g(x) = ax + b \quad \text{where } a \text{ and } b \text{ are constants.}$$

$$g(3) = 20 \quad \text{and} \quad f^{-1}(33) = g(1)$$

Find the value of a and the value of b .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

(Total for Question 22 is 5 marks)

23 S is a geometric sequence.

- (a) Given that $(\sqrt{x} - 1)$, 1 and $(\sqrt{x} + 1)$ are the first three terms of S, find the value of x .
You must show all your working.

.....
(3)

- (b) Show that the 5th term of S is $7 + 5\sqrt{2}$

(2)

(Total for Question 23 is 5 marks)

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– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Q	Question Title	Score			Clip Number
1a	Median from a grouped frequency table		/	1	416
1b	Draw a frequency polygon		/	2	441
2	Metric and imperial conversion, direct proportion		/	3	705, 708, 341
3	Density		/	3	729
4	Share in a given ratio		/	3	333
5a	Find the reciprocal of a number		/	1	71
5b	Error intervals		/	2	774
6	Algebra and perimeter, area of compound shapes		/	5	552, 555
7	Multiply numbers in standard form		/	2	125, 123
8a	Experimental probability		/	1	356
8b	Experimental probability		/	2	356
9a	Exponential decay		/	2	811
9b	Exponential decay, income and rates of pay		/	3	756, 811
10a	Mutually exclusive events		/	1	354
10b	Probability of single events		/	2	352
11a	Cumulative frequency diagrams		/	1	438
11b	Cumulative frequency diagrams		/	1	438
11c	Cumulative frequency diagrams		/	2	438
12	Independent events and probability trees, expectation		/	3	361, 355
13	Complete the square		/	2	235
14	Calculate the volume of a shape using similar shapes and ratios		/	3	621
15a	Substitution, iteration		/	2	322, 783
15b	Iteration		/	2	322
15c	Iteration		/	3	322
15d	Iteration		/	2	322
16	Calculate the upper and lower bounds of calculations		/	3	139, 776
17	Area of a triangle ($\frac{1}{2}ab\sin C$), cosine rule, sine rule		/	5	518, 527, 521
18a	Area under a curve - trapezium rule		/	3	892
18b	Area under a curve - accuracy of estimates		/	1	892
19	Circles and straight lines		/	5	319
20	Use angle facts to prove a circle theorem		/	4	593, 486, 487
21	Solve geometrical problems using vectors		/	5	636
Total			/	80	

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

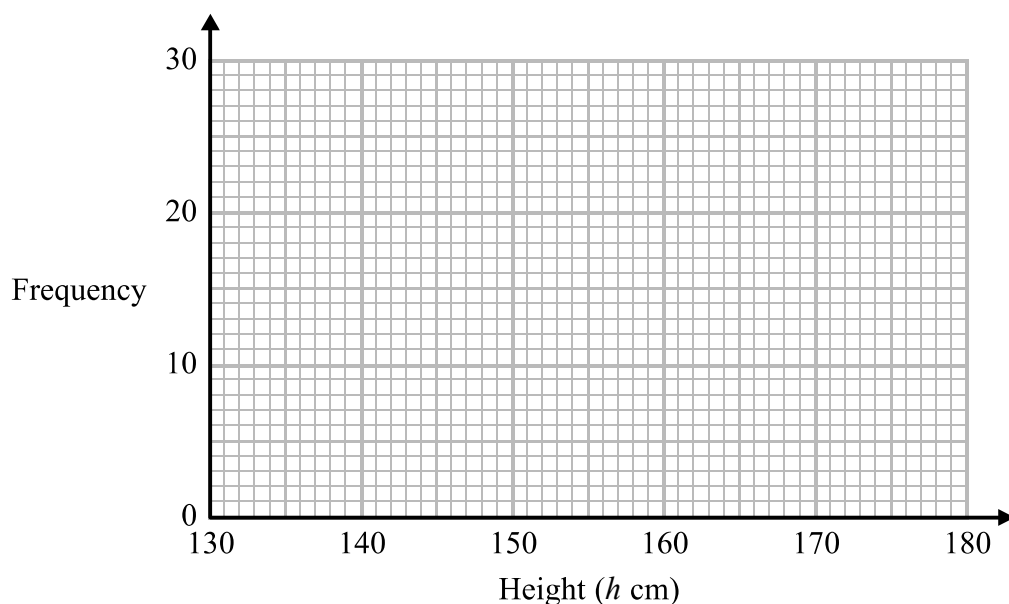
- 1** The table shows information about the heights of 80 children.

Height (h cm)	Frequency
$130 < h \leq 140$	4
$140 < h \leq 150$	11
$150 < h \leq 160$	24
$160 < h \leq 170$	22
$170 < h \leq 180$	19

- (a) Find the class interval that contains the median.

.....
(1)

- (b) Draw a frequency polygon for the information in the table.



(2)

(Total for Question 1 is 3 marks)

- 2** In London, 1 litre of petrol costs 108.9p
In New York, 1 US gallon of petrol costs \$2.83.

1 US gallon = 3.785 litres
£1 = \$1.46

In which city is petrol better value for money, London or New York?
You must show your working.

(Total for Question 2 is 3 marks)

- 3** A gold bar has a mass of 12.5 kg.
The density of gold is 19.3 g/cm³
Work out the volume of the gold bar.
Give your answer correct to 3 significant figures.

..... cm³

(Total for Question 3 is 3 marks)

- 4 There are only blue pens, green pens and red pens in a box.
The ratio of the number of blue pens to the number of green pens is 2 : 5
The ratio of the number of green pens to the number of red pens is 4 : 1
There are less than 100 pens in the box.
What is the greatest possible number of red pens in the box?

.....
(Total for Question 4 is 3 marks)

- 5 (a) Find the value of the reciprocal of 1.6.
Give your answer as a decimal.

.....
(1)

Jess rounds a number, x , to one decimal place.
The result is 9.8.

- (b) Write down the error interval for x .

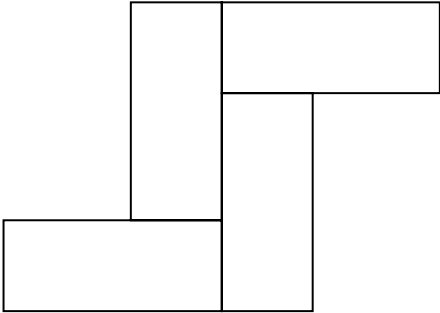
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(2)

(Total for Question 5 is 3 marks)

6 Here is a rectangle.



The length of the rectangle is 7 cm longer than the width of the rectangle.
4 of these rectangles are used to make this 8-sided shape.



The perimeter of the 8-sided shape is 70 cm.
Work out the area of the 8-sided shape.

..... cm²
(Total for Question 6 is 5 marks)

- 7 Work out $(13.8 \times 10^7) \times (5.4 \times 10^{-12})$
Give your answer as an ordinary number.

.....
(Total for Question 7 is 2 marks)

8 When a drawing pin is dropped it can land point down or point up.

Lucy, Mel and Tom each dropped the drawing pin a number of times.

The table shows the number of times the drawing pin landed point down and the number of times the drawing pin landed point up for each person.

	Lucy	Mel.	Tom
point down	31	53	16
point up	14	27	9

Rachael is going to drop the drawing pin once.

- (a) Whose results will give the best estimate for the probability that the drawing pin will land point up?
Give a reason for your answer.

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

Stuart is going to drop the drawing pin twice.

- (b) Use all the results in the table to work out an estimate for the probability that the drawing pin will land point up the first time and point down the second time.

.....
(2)

(Total for Question 8 is 3 marks)

9 Jack bought a new boat for £12 500.

The value, £ V , of Jack's boat at the end of n years is given by the formula

$$V = 12\,500 \times (0.85)^n$$

- (a) At the end of how many years was the value of Jack's boat first less than 50% of the value of the boat when it was new?

.....
(2)

A savings account pays interest at a rate of $R\%$ per year.

Jack invests £5500 in the account for one year.

At the end of the year, Jack pays tax on the interest at a rate of 40%.

After paying tax, he gets £79.20.

- (b) Work out the value of R .

.....
(3)

(Total for Question 9 is 5 marks)

- 10** There are only blue counters, yellow counters, green counters and red counters in a bag.
 A counter is taken at random from the bag.
- The table shows the probabilities of getting a blue counter or a yellow counter or a green counter.

Colour	blue	yellow	green	red
Probability	0.2	0.35	0.4	

- (a) Work out the probability of getting a red counter.

.....
(1)

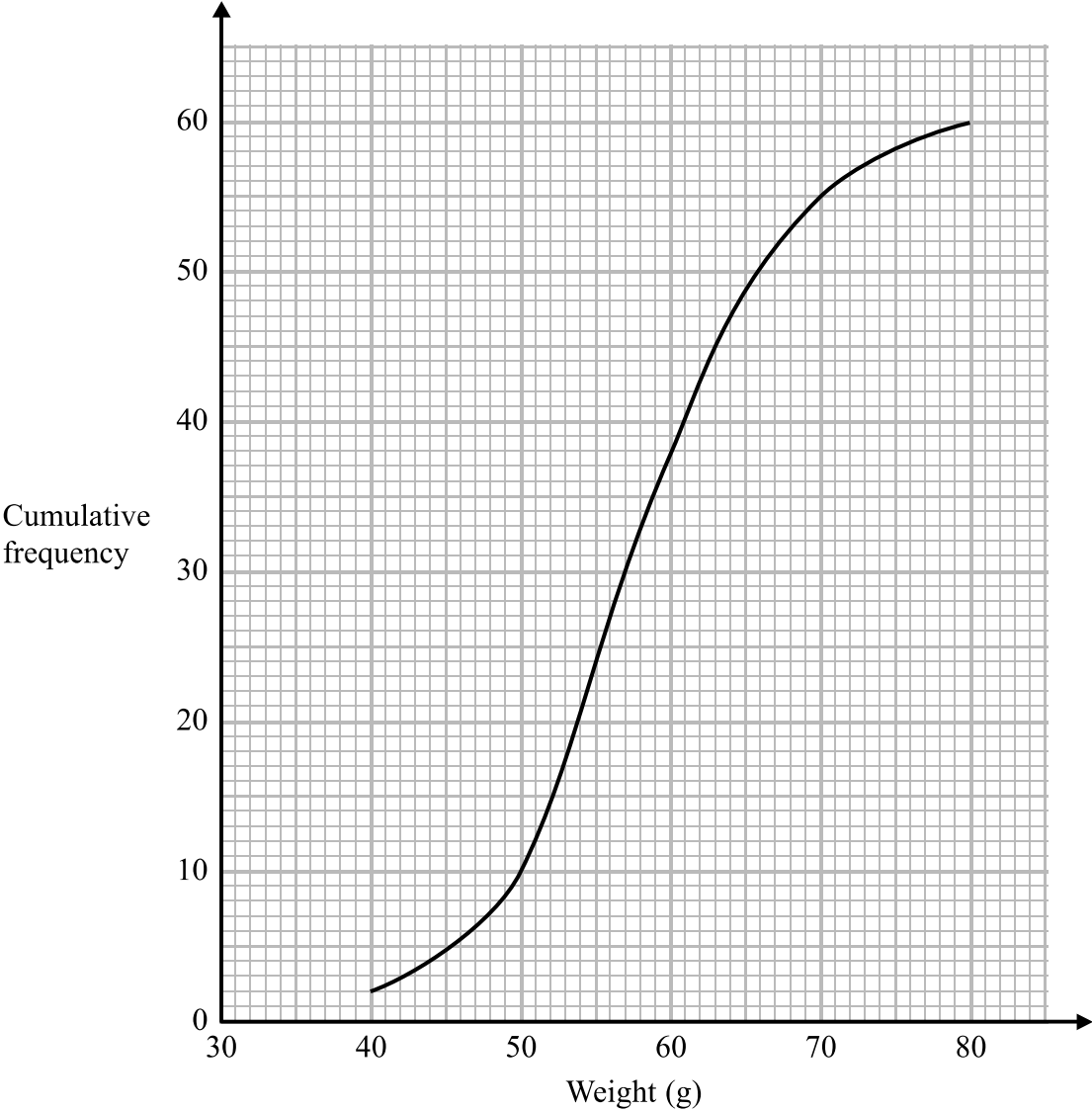
- (b) What is the least possible number of counters in the bag?
 You must give a reason for your answer.

.....

(2)

(Total for Question 10 is 3 marks)

11 The cumulative frequency graph shows information about the weights of 60 potatoes.



(a) Use the graph to find an estimate for the median weight.

..... g
(1)

Jamil says,

“ $80 - 40 = 40$ so the range of the weights is 40 g.”

(b) Is Jamil correct?

You must give a reason for your answer.

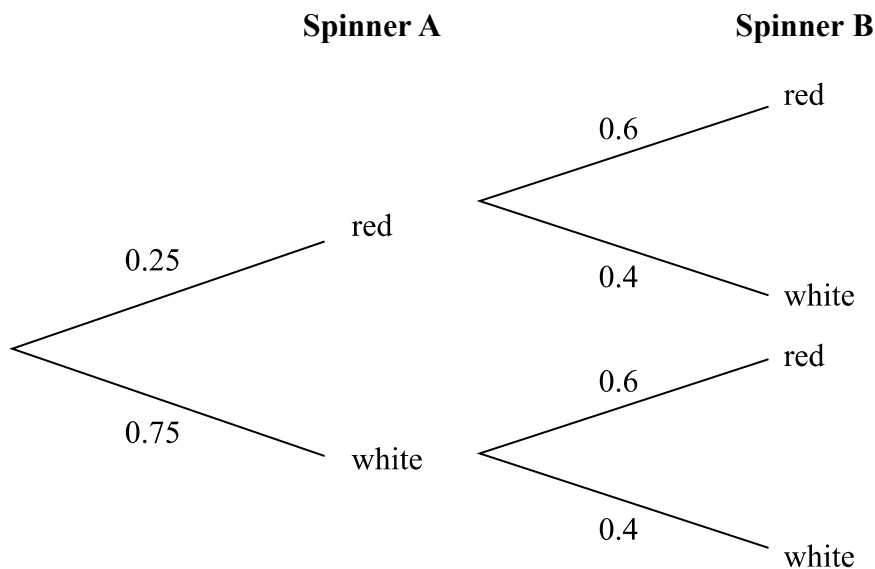
.....
.....
(1)

(c) Show that less than 25% of the potatoes have a weight greater than 65 g.

(2)

(Total for Question 11 is 4 marks)

- 12** Alan has two spinners, spinner **A** and spinner **B**.
 Each spinner can land on only red or white.
 The probability that spinner **A** will land on red is 0.25.
 The probability that spinner **B** will land on red is 0.6.
 The probability tree diagram shows this information.



Alan spins spinner **A** once and he spins spinner **B** once.
 He does this a number of times.
 The number of times **both** spinners land on red is 24.
 Work out an estimate for the number of times **both** spinners land on white.

.....
 (Total for Question 12 is 3 marks)

- 13** Write $x^2 + 6x - 7$ in the form $(x + a)^2 + b$ where a and b are integers.

.....
(Total for Question 13 is 2 marks)

- 14** Cone **A** and cone **B** are mathematically similar.
The ratio of the volume of cone **A** to the volume of cone **B** is 27 : 8
The surface area of cone **A** is 297 cm²
Show that the surface area of cone **B** is 132 cm²

(Total for Question 14 is 3 marks)

15 (a) Show that the equation $x^3 + 7x - 5 = 0$ has a solution between $x = 0$ and $x = 1$

(2)

(b) Show that the equation $x^3 + 7x - 5 = 0$ can be arranged to give $x = \frac{5}{x^2 + 7}$

(2)

(c) Starting with $x_0 = 1$, use the iteration formula $x_{n+1} = \frac{5}{x_n^2 + 7}$ three times to find an estimate for the solution of $x^3 + 7x - 5 = 0$

.....
(3)

- (d) By substituting your answer to part (c) into $x^3 + 7x - 5$,
comment on the accuracy of your estimate for the solution to $x^3 + 7x - 5 = 0$

.....
.....

(2)

(Total for Question 15 is 9 marks)

- 16** The petrol consumption of a car, in litres per 100 kilometres, is given by the formula

$$\text{Petrol consumption} = \frac{100 \times \text{Number of litres of petrol used}}{\text{Number of kilometres travelled}}$$

Nathan's car travelled 148 kilometres, correct to 3 significant figures.
The car used 11.8 litres of petrol, correct to 3 significant figures.

Nathan says,

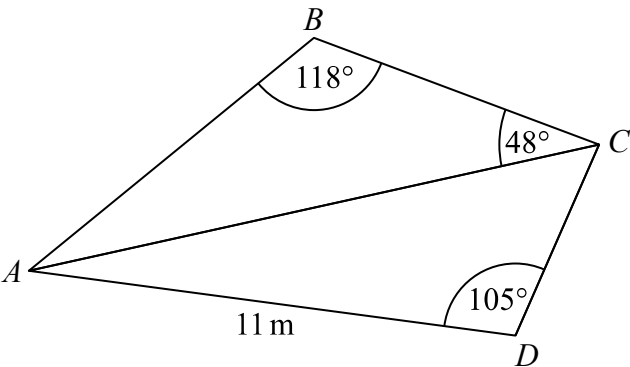
“My car used less than 8 litres of petrol per 100 kilometres.”

Could Nathan be wrong?

You must show how you get your answer.

(Total for Question 16 is 3 marks)

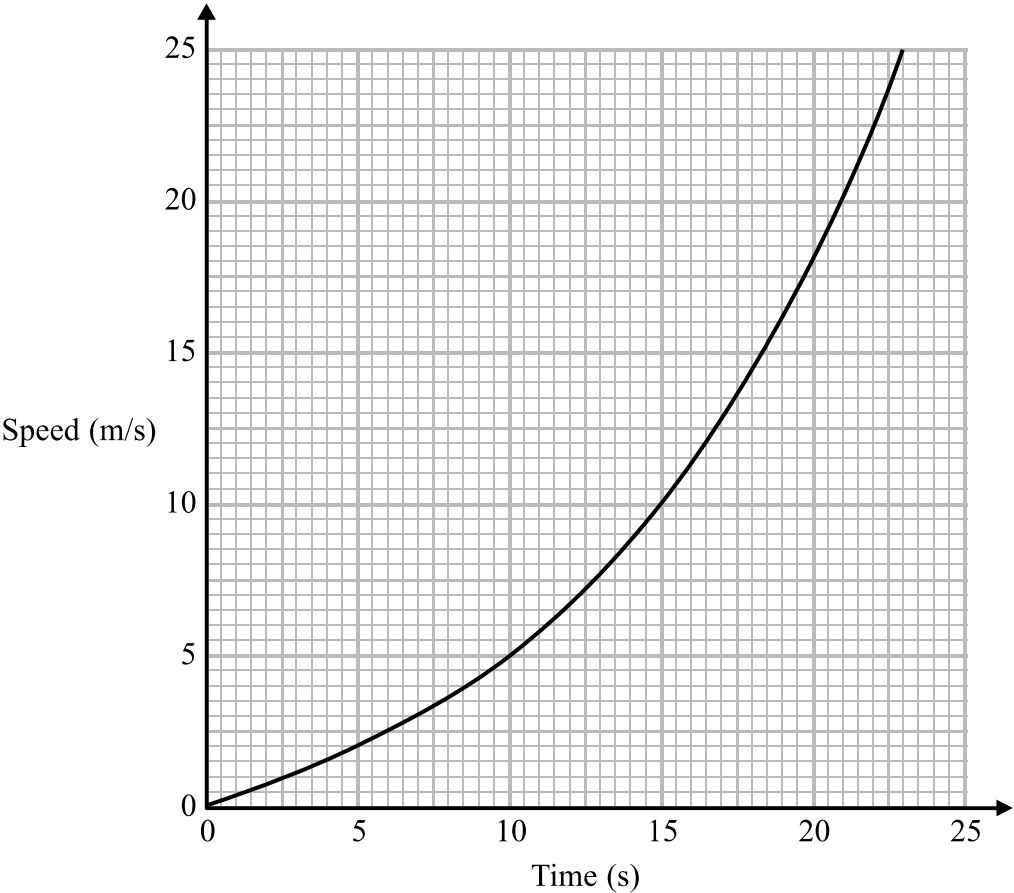
17 ABC and ADC are triangles.



The area of triangle ADC is 56 m^2
Work out the length of AB .
Give your answer correct to 1 decimal place.

..... m
(Total for Question 17 is 5 marks)

18 Here is a speed-time graph for a train.



- (a) Work out an estimate for the distance the train travelled in the first 20 seconds.
Use 4 strips of equal width.

..... m
(3)

- (b) Is your answer to (a) an underestimate or an overestimate of the actual distance the train travelled?
Give a reason for your answer.

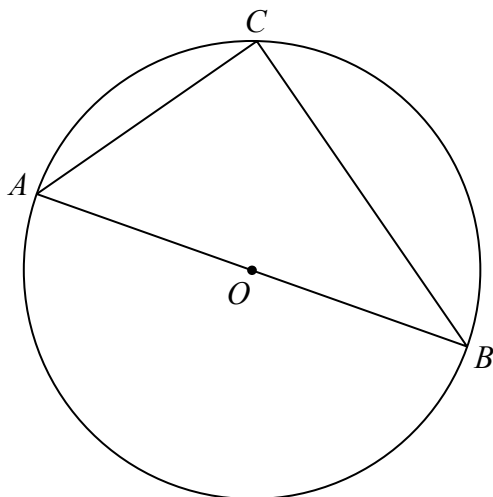
.....
.....
(1)

(Total for Question 18 is 4 marks)

- 19** Prove algebraically that the straight line with equation $x - 2y = 10$ is a tangent to the circle with equation $x^2 + y^2 = 20$

(Total for Question 19 is 5 marks)

20

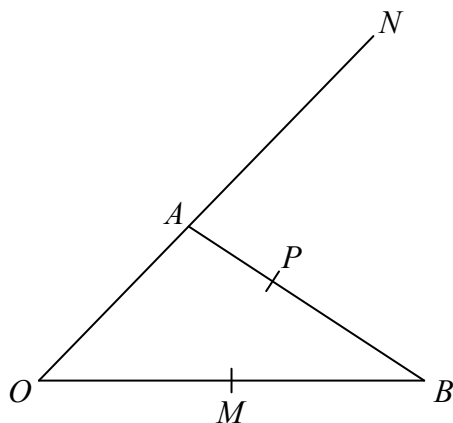


A , B and C are points on the circumference of a circle, centre O .
 AOB is a diameter of the circle.

Prove that angle ACB is 90°

You must **not** use any circle theorems in your proof.

(Total for Question 20 is 4 marks)



OAN , OMB and APB are straight lines.

$AN = 2OA$.

M is the midpoint of OB .

$$\vec{OA} = \mathbf{a} \quad \vec{OB} = \mathbf{b}$$

$$\vec{AP} = k \vec{AB} \text{ where } k \text{ is a scalar quantity.}$$

Given that MPN is a straight line, find the value of k .

.....
(Total for Question 21 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS