

Grade 5 'Final Push' Questions



80 Foundation GCSE Questions for students aiming to secure Grade 5s from Grade 4s

Disclaimer:

I don't claim that these are 'Grade 5 Questions'. The questions are the harder topics and exam style questions for students aiming to secure 5s. They are designed to allow you to access the quirkier questions and the later questions on the papers. Some questions are 'easier' than the top end questions but are ones that students often make mistakes on.

The questions are designed to test students understanding of concepts and topics and allow them to identify areas to work on. You are not expected to get them all! Getting a good proportion of them should help tip you into a grade 5 if you have been struggling to make the jump from 4-5.

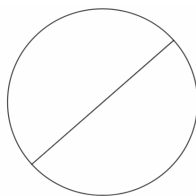
I have assumed you can do the basics of Foundation and are already working at around grade 4 before starting this book. Please use the help book or foundation book to ensure you are ready to take on the questions. Doing only these questions won't guarantee a grade 5, you must know the basics!

The questions are suitable for all exam boards. Please check with your teacher or exam officer which board you are studying as there are subtle differences.

Answers are available at www.m4ths.com in video format.

Questions 1 – 8 (Non Calculator)

(1) The diagram below shows a circle with diameter 10cm .



Show that the area of the circle is $25\pi\text{cm}^2$.

(2) Fred goes to the cinema two weeks in a row.

The first time he goes he buys 6 adult tickets which cost £42.60 in total.

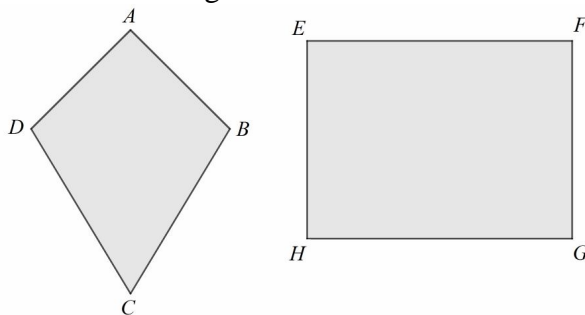
The second time he goes he buys 2 adult tickets and 3 child tickets. The cost this time is £31.30.

Find the cost of buying 2 child tickets and 4 adult tickets.

(3) Sam and Colin are left some money by their grandfather and it's shared in the ratio 7:5.

Given that Colin has £3200 less than Sam, find out how much money their grandfather left them in total.

(4) The diagram below shows a kite and a rectangle.



The area of the kite is half the area of the rectangle.

Given that the length of AC is equal to the length of HG , which one of the following statement is true?

DB is twice the length of EH

DB is half the length of EH

DB is the same length as EH

(5) Three of the first six terms of a Fibonacci type sequence are shown below. The first term is 4:

4, __, 11, __, 29, __ ...

(a) Fill out the three blanks to find the missing terms in the sequence.

(b) Write down how many double digit prime numbers there are in the sequence.

(6) Catherine is taking her exams to get into college.

Catherine will sit 5 exams in total.

Each exam is out of 20 marks.

Catherine needs a mean average of 16 marks per paper to get her place at college.

After 4 exams Catherine has a mean average of 14 marks per paper.

Show that Catherine cannot score enough marks to get into college regardless of her score in the 5th paper.

(7) An isosceles triangle has angles A , B and C .

Angle A is 71° .

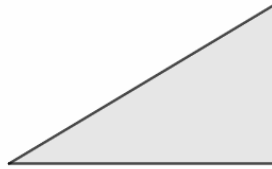
How many different sizes can Angle B take?

(8) Solve $2(3x+1) = 1-4x$

Give your answer as a fraction.

Questions 9 – 16 (Calculator Allowed)

(9) The two shorter sides of the right angle triangle shown below are 3cm and 5cm in length.



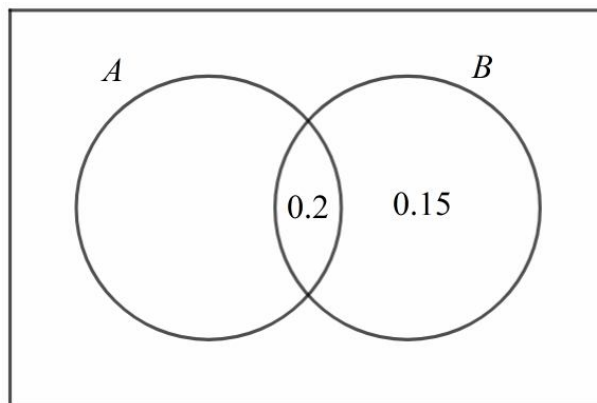
Show that the perimeter of the triangle less than 14cm.

(10) Part of an arithmetic (linear) sequence is shown below:

$$4, 2x+1, 10, 13, 6x-2$$

Find the value of x .

(11) The Venn Diagram below shows some information about the probabilities of events A and B happening.



Given that $P(A) = 2P(B)$, complete the Venn Diagram.

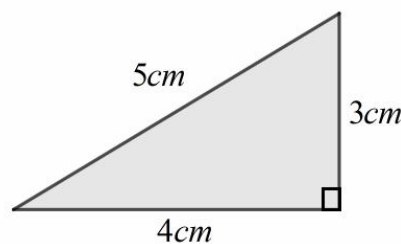
(12) Given that $p^n \div p^{-3} = p^{-4}$, find the value of n .

(13) An iPad is in the sales.

The price has been reduced by 18% and is now £344.40.

Find the price of the iPad before the reduction.

(14) Show that the size of the smallest angle in the triangle below is 36.9° to one decimal place.



*Diagram not
drawn to scale*

(15) The median of the data set below is 7:

$$5, 11, x, 6, 4, 10$$

Find the value of x

(16) The bearing of point A from point B is 270°

Which **one** of the following statements correct?

A is due north of B

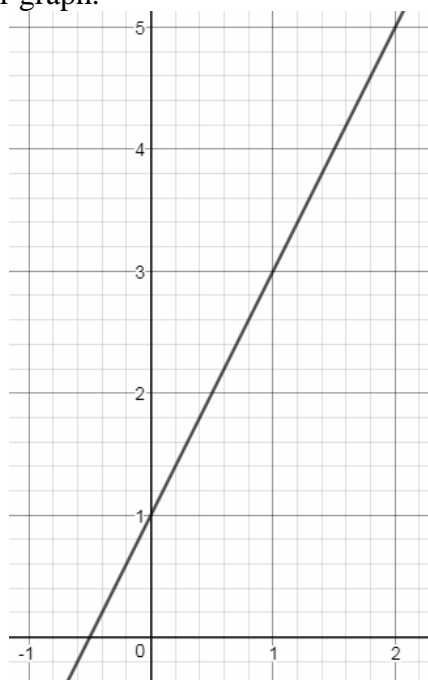
A is due south of B

B is due east of A

B is due west of A

Questions 17 – 24 (Non Calculator)

(17) The diagram shows part of a linear graph.



Which **one** of the equations below does the graph represent?

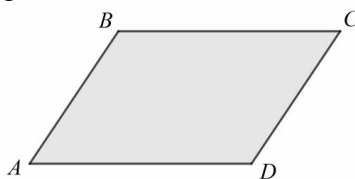
$$y = 2x + 1$$

$$x + y = 1$$

$$x = 1 + 2y$$

$$y = 2x$$

(18) The diagram below shows a parallelogram.



The size of Angle A is half the size of Angle B .

Work out the size of Angle D .

(19) Solve the simultaneous equations:

$$\begin{aligned}x + y &= 11 \\x - y &= 4\end{aligned}$$

(20) Using the formula $\text{Density} = \frac{\text{Mass}}{\text{Volume}}$, find the Mass of a ball with volume 200cm^3 and density 1.5g/cm^3

(21) Jimmy writes down two different integers.
The first number, rounded to the nearest 5, is 30.
The second number, rounded to 1 significant figure, is 40.

What is the maximum possible difference between the two numbers Jimmy has written down?

(22) Which **one** of the 4 options below can be written as an identity for $a^2 - b^2$?

$$(a - b)^2$$

$$(a + b)(a - b)$$

$$a^2 - a + b^2 - b$$

$$-(a + b)^2$$

(23) Write ratio 4:12:6 on the form $1:m:n$ where m is an integer and n is a simplified fraction.

(24) In a test the median score of the class is 32, the mode 34 and the mean 35.6.
Write down a test score that could be seen as an outlier.

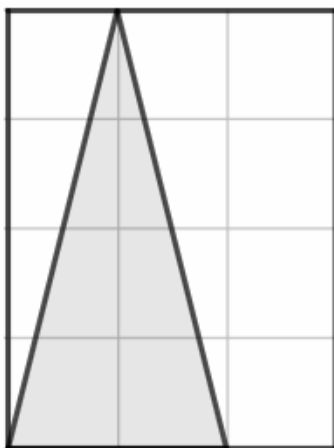
Questions 25 – 32 (Calculator Allowed)

(25) Find an estimated mean for the data set below. Give your answer to 2 decimal places.

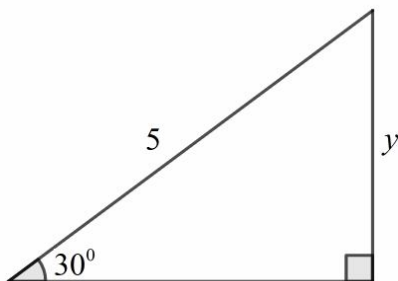
Length of Worm (cm)	Frequency
$5 \leq l < 10$	7
$10 \leq l < 20$	12
$20 \leq l < 30$	15
$30 \leq l < 35$	8

(26) In a survey students were asked if they bought their lunch from the canteen or took a lunch box instead. The ratio of students who bought their lunch from the canteen to those bringing a lunch box was 4:1. If a pie chart is drawn to show this information, how many degrees would be needed to represent the sector showing people who bought their lunch from the canteen?

(27) What proportion of the rectangle shown below is shaded?



(28) The diagram below shows a right angle triangle



Which **one** of the following calculations could be used to find the value of y ?

$$y = 5 \times \tan(30)$$

$$y = 5 \div \sin(30)$$

$$y = 5 \times \cos(30)$$

$$y = 5 \times \sin(30)$$

(29) Katie travels 128 miles home from to university at an average speed of 42 miles per hour. If she leaves at 11:30am, what time will she arrive?
Give your answer to the nearest minute.

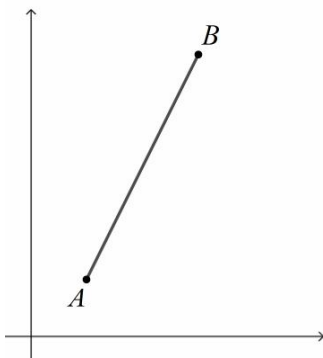
(30) The pressure a box exerts on the floor is $20N / m^2$. The force the box exerts on the floor is $80N$. Jake says that the area of the bottom of the box is $1600m^2$
Is he correct? You must explain your answer.

(31) Factorise $x^2 + x - 12$

(32) Find the value of n in the following equation: $3 + 4\sqrt{n} = 199$

Questions 33 – 40 (Non Calculator)

(33) The diagram below shows the line AB .



The coordinates of point A are $(1, 1)$. The gradient of the line is 2.

Which **one** of the following options **could** be the coordinates of the point B ?

$(2, 2)$

$(3, 5)$

$(4, 6)$

$(4, 10)$

(34) Find the values of a and b in the following calculation: $\begin{pmatrix} 2a \\ -3 \end{pmatrix} + \begin{pmatrix} 7 \\ b \end{pmatrix} = \begin{pmatrix} 3 \\ -14 \end{pmatrix}$

(35) A bag of counters contains only red counters and blue counters.

There are n red counters and m blue counters in the bag.

One counter is chosen at random.

Which **one** of the following is an expression for the probability of a blue counter being chosen?

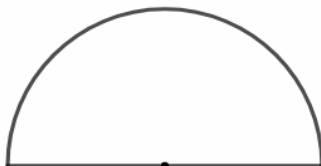
$$\frac{1}{m}$$

$$\frac{m}{n}$$

$$\frac{m}{n+m}$$

$$\frac{m+n}{m}$$

(36) The diagram below shows a semicircle with a radius of $2cm$.



Show that the **total** perimeter of the semicircle can be written as $(4 + 2\pi)cm$.

(37) Find the value of $(4.2 \times 10^7) \div (5 \times 10^3)$.

Give your answer in standard form.

(38) On a spinner there are 3 sections, A , B and C .

$$P(A) = \frac{1}{3}$$

$$P(B) = 3P(C).$$

Find $P(C)$. Give your answer as a simplified fraction.

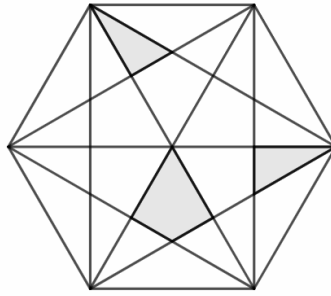
(39) Find the size of each interior angle of a regular octagon?

(40) As a product of its prime factors, 2640 can be written as $2^4 \times 3 \times 5 \times n$.

Find the value of n

Questions 41 – 48 (Calculator Allowed)

(41) The diagram below shows a regular polygon. Some parts of the polygon have been shaded.



Add shading to the diagram such that $\frac{1}{6}$ of the polygon is shaded.

(42) In a school there are 210 students in Year 11.

170 of the students do Maths.

162 of the students do English.

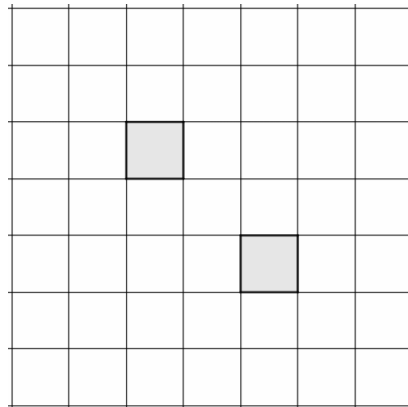
28 of the students do not study either subject.

Find out how many students only do Maths.

(43) Draw two additional squares on the grid below to create a pattern that has both:

Line symmetry of 2

Rotational symmetry of order 2.



(44) Make p the subject of the equation $\frac{2p-1}{3} = q$

(45) In a school there are 800 students.

$\frac{3}{10}$ of the total number of students are in Year 7 and Year 8 combined.

$\frac{1}{4}$ of the total number of students are in Year 9.

The remaining students are in either Year 10 or Year 11 in the ratio 5:4

What percentage of the pupils in the school are in Year 11?

(46) What is the gradient of the line with equation $x + y = 6$?

(47) John has two sisters. John is 4 years older than one sister and twice the age of the other.

Their combined age is 76.

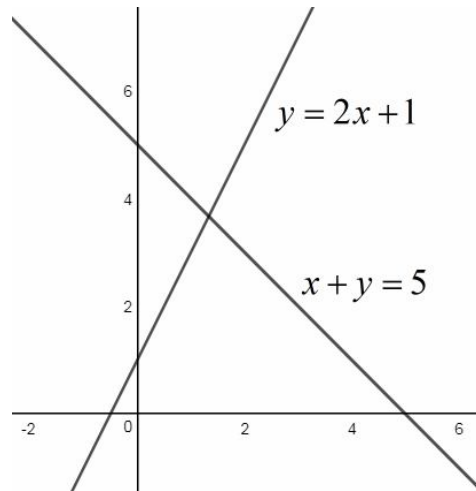
How old is John?

(48) Colin is 160cm tall to the nearest 10cm.

Write an inequality to represent the set of values his height could take.

Questions 49 – 56 (Non Calculator)

(49) The diagram below shows part of the graphs of $y = 2x + 1$ and $x + y = 5$.



Use the two graphs to **estimate** the solutions to the simultaneous equations:

$$\begin{aligned}x + y &= 5 \\ y &= 2x + 1\end{aligned}$$

(50) The diagram below shows a square. The area of the square is 16 square units.



What is the length of each diagonal in the square?

$\sqrt{32}$

4

16

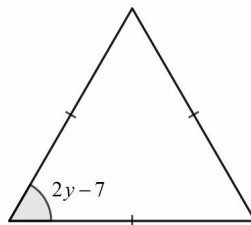
$\sqrt{8}$

(51) Find the value of $3\frac{1}{4} - 2\frac{1}{3}$

Give your answer as a simplified fraction.

(52) What is the maximum number of interior angles of a pentagon that can be reflex angles?

(53) The diagram below shows a triangle with an angle of $2y - 7$ degrees.



Show that y is not an integer.

(54) Expand and simplify $x(2x - 1) - 3(5 - x)$

(55) A square is drawn on a set of axes with its vertices at the points (2,3), (2,4), (3,3) and (3,4). The square is reflected in the line $y = x$. What are the coordinates of the vertices of the reflected shape?

(56) Write down the multiplier used for decreasing a value by 11.5%

Questions 57 – 64 (Calculator Allowed)

(57) Which of the following equations models inverse proportion?

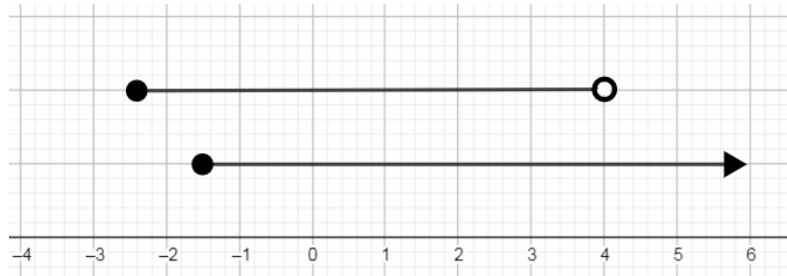
$$y = kx$$

$$y = 3x$$

$$y = 1 - kx$$

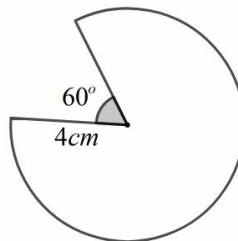
$$y = \frac{5}{x}$$

(58) Write down all of the integers that satisfy both of the inequalities shown in the diagram below.



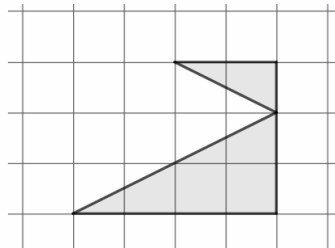
(59) Bo invests £400 in a bank account paying 5% compound interest each year. Find the value of her investment after 7 years. (She doesn't add or take out any money during the 7 years).

(60) The major sector shown below has a radius of 4cm . The acute angle shown is 60° .



Find the area of the major sector. Give your answer to one decimal place.

(61) The diagram below shows two mathematically similar right angle triangles.



The hypotenuse of the larger triangle has length p .
The hypotenuse of the smaller triangle has length $2q$.

Express p in terms of q .

(62) Which are the two solutions to the equation $x^2 + 5x + 6 = 0$

$$x = 2 \text{ \& } x = 3$$

$$x = 1 \text{ \& } x = 6$$

$$x = -2 \text{ \& } x = -3$$

$$x = 2 \text{ \& } x = -3$$

(63) Which **one** of the following equations would have a graph that is **not** parallel to the line $y = 2x + 1$?

$$y = 3 + 2x$$

$$2y = 4x - 1$$

$$y + 2x = 3$$

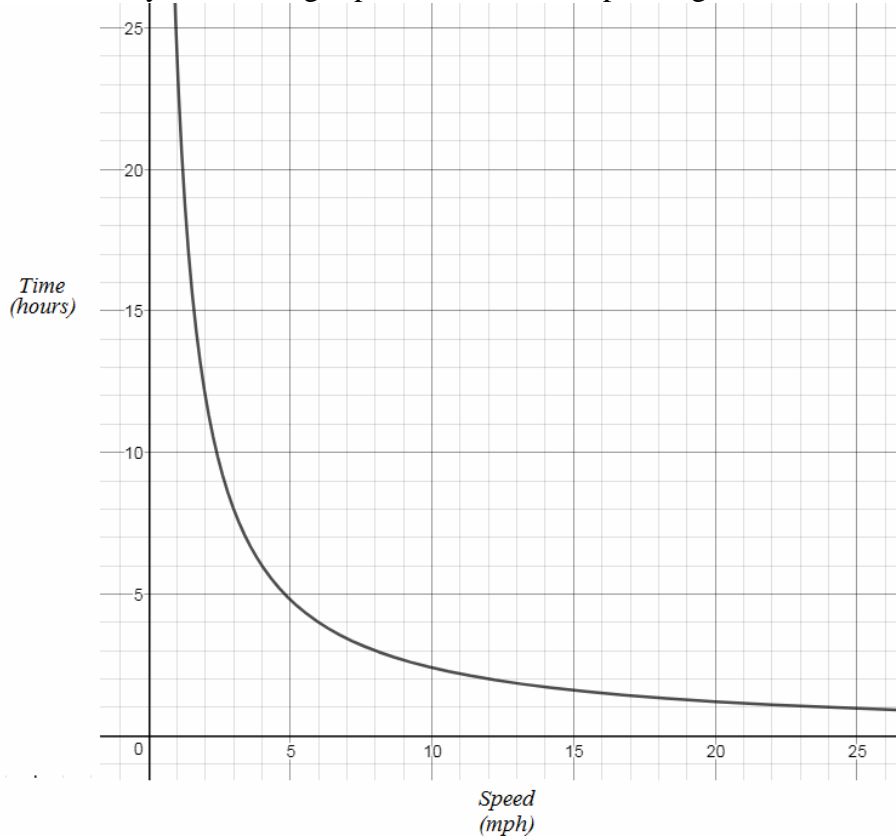
$$2x - y = 0$$

(64) Sketch a graph that represents direct proportion.

Questions 65 – 72 (Non Calculator)

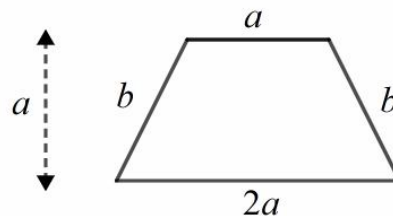
(65) Given that $\frac{2}{3} \div \frac{n}{5} = \frac{10}{21}$, find the value of n .

(66) The graph below shows a cyclist's average speed and the corresponding time taken for her journey.



Use the graph to find the distance of the cyclist's journey.

(67) The diagram below shows a trapezium.



Which of the following expressions gives the area of the trapezium?

$3ab$

$\frac{3}{2}a^2$

$2a^2b$

$3a + 2b$

(68) Find the value of $\cos(45^\circ)$.

(69) A painting increase in value from £80 to £100. Find the percentage increase in the value of the painting.

(70) Complete the table below for $xy = 1$

x	-2	-1	2	5	
y					0.1

(71) Given that $(x - 3)(x + 5) \equiv x^2 + ax - 15$, find the value of a .

(72) Given that the range of the data set 4, 3, -1, 10, x , 7 is equal to 15, find the **two** possible values of x

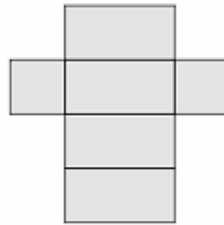
Questions 73 – 80 (Calculator Allowed)

(73) Using the formula $V = \frac{4}{3}\pi r^3$, find the volume of a sphere with diameter of 1.2cm.

Give your answer to 2 significant figures.

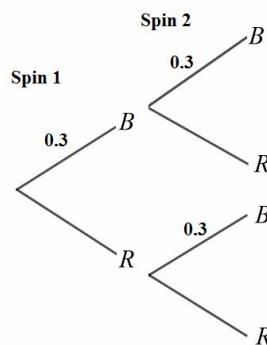
(74) Solve the equation $3x^2 - 1 = 14$ giving your **answers** to 2 decimal places.

(75) The diagram below shows the net of a cuboid. The net is made up of 2 congruent squares and 4 congruent rectangles. The length of the net is 4.8cm. The width of the net is also 4.8cm



Find the volume of the cuboid when the net is made into a cuboid. Give your answer to 1 decimal place.

(76) The diagram below shows a partly completed tree diagram.



The diagram shows some of the probabilities of the outcomes when a spinner is spun twice. The spinner can either land on blue (B) or red (R).

Which of the options below is the correct probability of the spinner landing on red with both spin 1 **and** spin 2?

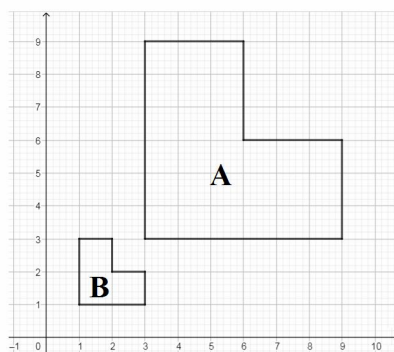
0

0.49

$\frac{1}{2}$

0.9

(77) Describe the single transformation that maps Shape A to Shape B?



(78) A car loses 10% of its value in the first year and 8% each year after that. The new price of the car is £25000. Find the value of the car after 4 years giving your answer to the nearest pound.

(79) Jenny says that the product of a square number and a prime number won't be a cube number. Show that she is wrong.

(80) A plastic plant is made to be 30cm tall. The height of the plant has an error interval of 5%. Express the possible heights as an inequality.