Bearings
Video 26 on Corbettmaths

Question 5: Give these directions of travel as three figure bearings

(a) North (b) South-east (c) West (d) North-east

(e) East (f) South-west (g) South (h) North-west

Question 6: A dolphin is on a bearing of 100° from the island.
The same dolphin is on a bearing of 015° from the lighthouse.
On a sketch of the diagram below, mark the location of the dolphin.

Question 7: A hot-air balloon is on a bearing of 140° from the radar A.
The same hot-air balloon is on a bearing of 065° from the radar B.
On a sketch of the diagram below, mark the location of the hot-air balloon.

Bearings
Video 26 on Corbettmaths

Question 8: A UFO is on a bearing of 015° from the radar A.
The same UFO is on a bearing of 315° from the radar B.
On a sketch of the diagram below, mark the location of the UFO.

Question 9:

(a) The bearing of A from B is 025°, find the bearing of B from A.
(b) The bearing of A from B is 061°, find the bearing of B from A.
(c) The bearing of A from B is 098°, find the bearing of B from A.
(d) The bearing of A from B is 102°, find the bearing of B from A.
(e) The bearing of A from B is 193°, find the bearing of B from A.
(f) The bearing of A from B is 222°, find the bearing of B from A.
(g) The bearing of A from B is 315°, find the bearing of B from A.

Question 10: Make a copy of the diagram below into your book.

(a) Find the bearing of B from A.
(b) Find the bearing of A from B.

Use the scale 1cm represents 20miles.

(c) From your diagram, work out the real distance between A and B.

C is 140 miles from B on a bearing of 110°.

(d) On your diagram, mark C with a cross.

Speed, Distance, Time

Videos 299 on Corbettmaths

11. Mr Jenkins catches the 11:45am bus from London to Glasgow.
The distance between the two cities is 407 miles.
The bus travels at an average speed of 55mph.
What time should he arrive in Glasgow?

12. Michael drives 143 miles from town A to town B in 2 hours 36 minutes.
He then drives from town B to town C at the same speed and it takes 21 minutes.

(a) Work out Michael's average speed from town A to town B.
(b) How far did Michael travel, in total, from town A to town C?

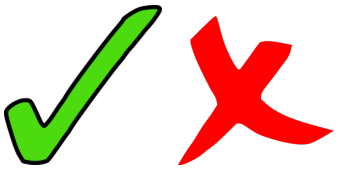
13. The distance from Junction 19 to Junction 20 on a motorway is 14 miles.
Bethany drove the distance in 15 minutes.
Max drove the distance at a speed of 52mph.
Who was faster?

14. The distance from Swindon to a village is 40 miles.
Vicky drives from the village to Swindon at 60 mph.
Charlie drives from the village to Swindon at 50mph.
Work out how much longer the journey takes Charlie.
Give your answer in minutes.

15. Miss Black completes a journey in 3 stages.
In stage 1, she drives at a speed of 40km/h for 45 minutes.
In stage 2, she drives at 60 km/h for 2 hours 9 minutes.
Altogether, over the 3 stages, Miss Black drives 171.6km in 3 hours 15 minutes
What is her average speed, in km/h, in stage 3?

16. The speed limit on a road is 40mph.
A scooter drives 9 miles in 13 minutes.
Is the scooter breaking the speed limit?

Answers



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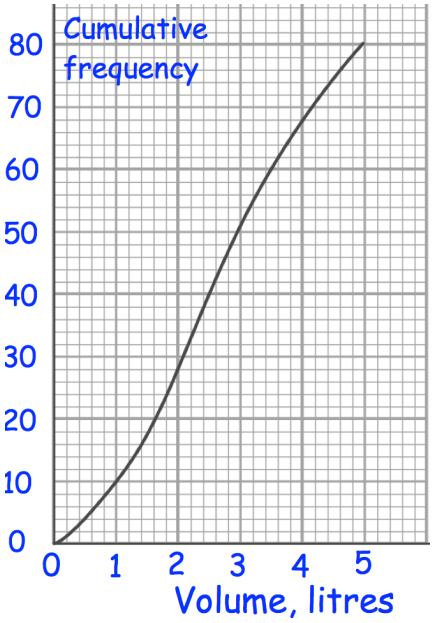
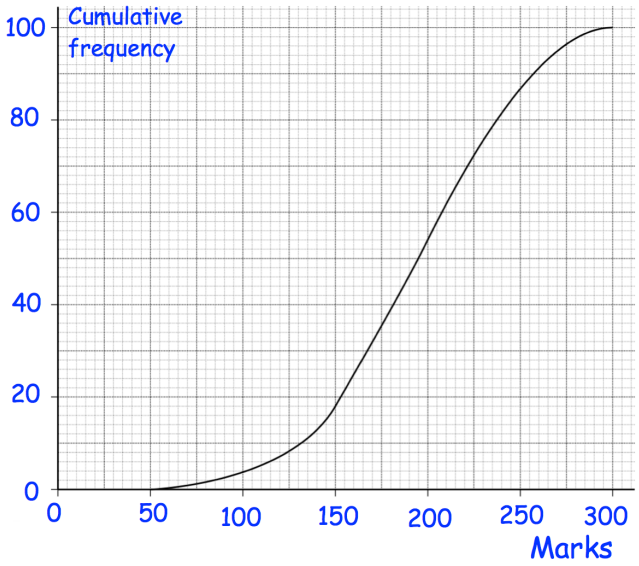
Cumulative Frequency Graphs

Videos 153 and 154 on www.corbettmaths.com

(c)



(d)



Question 7: The graph shows information about the time taken to solve a puzzle.

(a) How many people took less than 30 seconds?

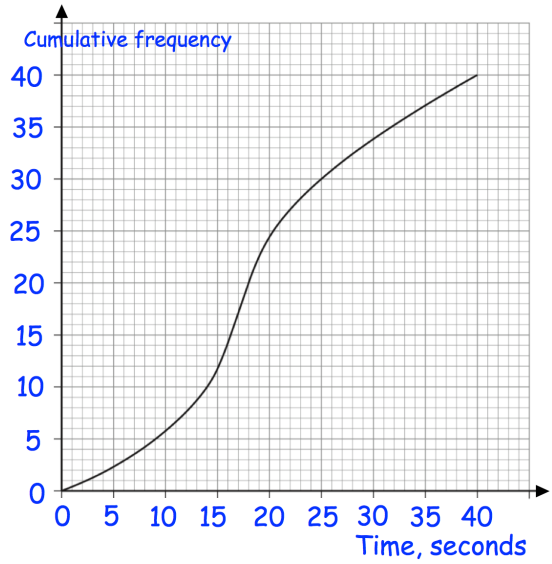
(b) How many people took less than 10 seconds?

(c) How many people took longer than 25 seconds?

(d) How many people took longer than 35 seconds?

(e) The fastest 10 people completed the puzzle in under how many seconds?

(f) The slowest 2 people completed the puzzle in longer than how many seconds?



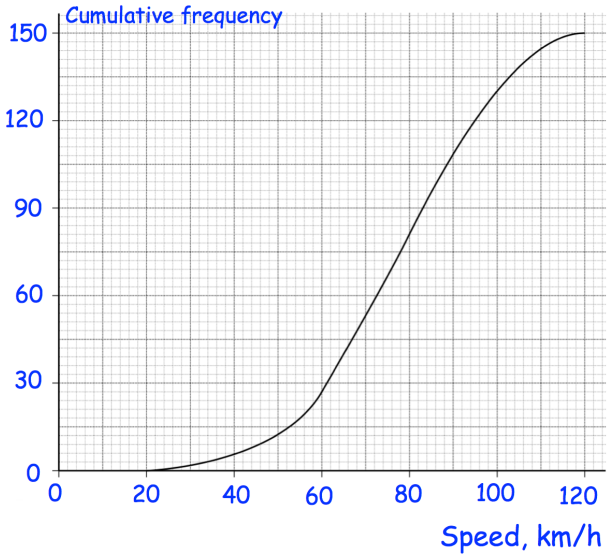
Question 8: The graph shows information about the speed of cars on a road.

(a) How many cars travelled under 50km/h?

(b) How many cars travelled over 110km/h?

(c) 42 cars were exceeding the speed limit. What is the speed limit?

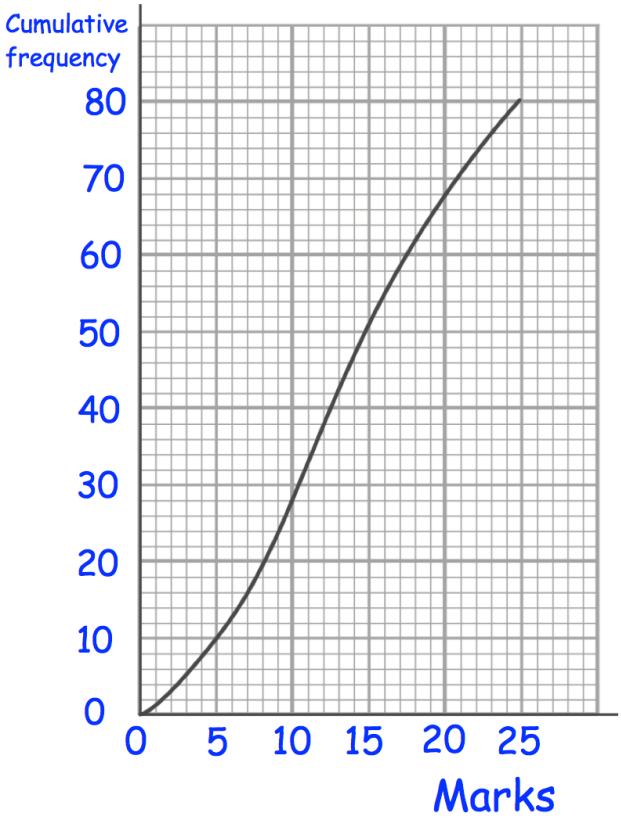
(d) Mr Rodgers says 18% of the cars were travelling too slowly on this road. Below what speed does he feel is too slow?



Cumulative Frequency Graphs

Videos 153 and 154 on www.corbettmaths.com

Apply



Question 1: Some students complete a quiz.
The cumulative frequency graph shows their results

(a) How many students completed the quiz?

(b) Complete the frequency table below.

(c) What percentage of the students scored above 20 marks?

Marks	Frequency
$0 < m \leq 5$	
$5 < m \leq 10$	
$10 < m \leq 15$	
$15 < m \leq 20$	
$20 < m \leq 25$	

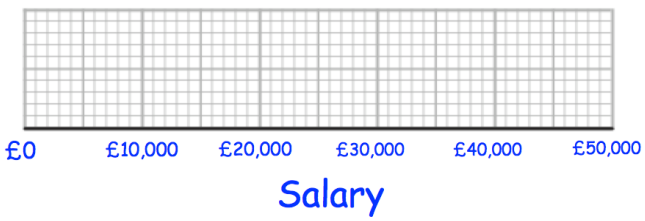
Question 2: The cumulative frequency graph below shows the salaries of 80 teachers.
The lowest salary is £4,000 and the highest salary is £39,000.

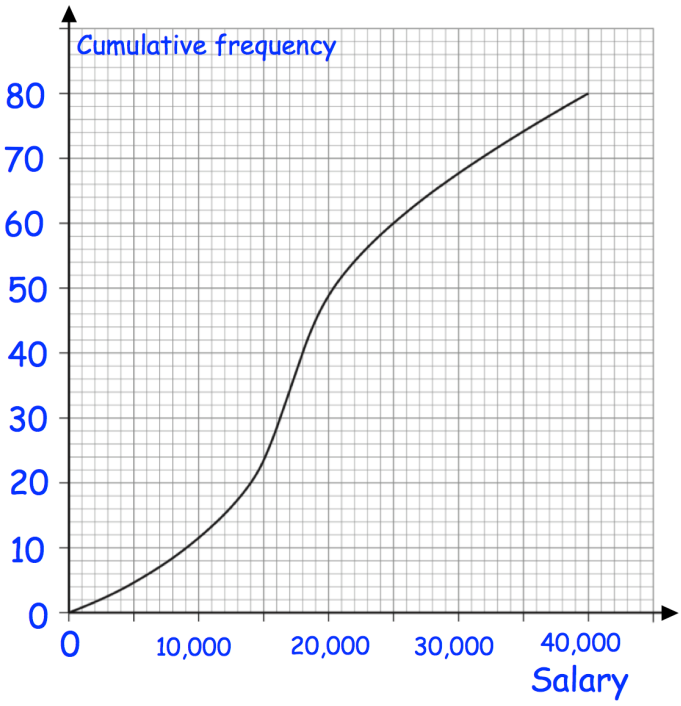
A teacher is picked at random to answer a survey.

(a) Find the probability that the teacher selected is paid less that £15,000.

(b) Find the probability that the teacher selected is paid over £25,000.

(c) Draw a box plot to represent the salaries.





Cumulative Frequency Graphs

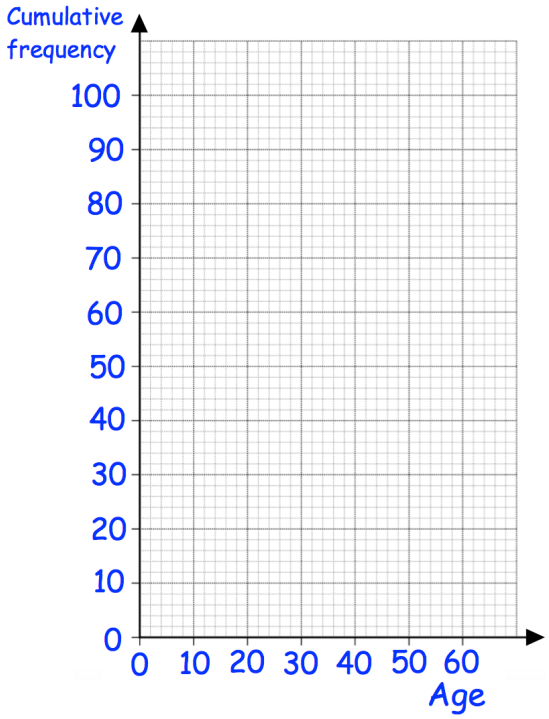
Videos 153 and 154 on www.corbettmaths.com

Question 3: The table shows information about the members of Abbeyville Cricket Club

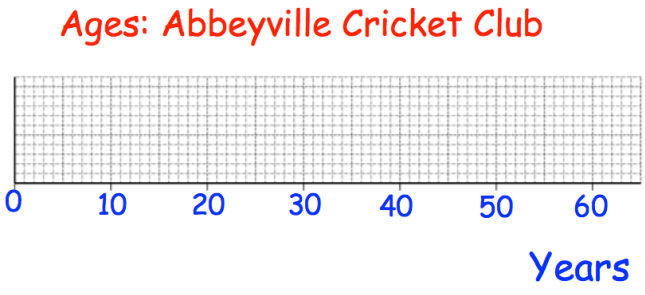
Age	Frequency
$0 < A \leq 10$	2
$10 < A \leq 20$	5
$20 < A \leq 30$	19
$30 < A \leq 40$	38
$40 < A \leq 50$	25
$50 < A \leq 60$	11

The youngest member is 9 and the oldest member is 58.

(a) Draw a cumulative frequency graph to represent this information.



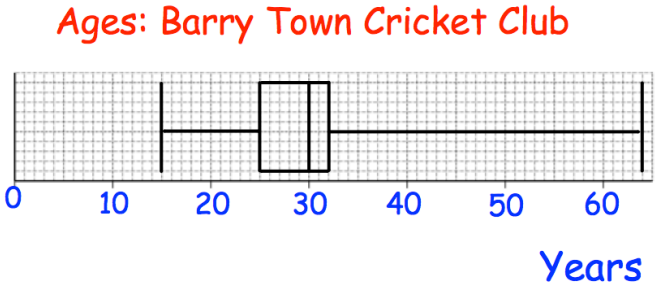
(b) Draw a box plot to represent this information



(c) Work out the interquartile of the ages of the members of Abbeyville Cricket Club.

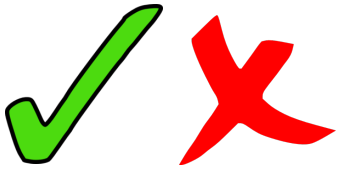
The box plot below shows information about Barry Town Cricket Club

(d) Write down the median age of the members of Barry Town Cricket Club



(e) Compare the distributions of the ages of the members of Abbeyville Cricket Club to the ages of the members of Barry Town Cricket Club.

Answers



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Sketching Quadratics
Video 265 on Corbettmaths

Question 5: Sketch the following graphs.

(a) $y = x^2 + 6x + 8$ (b) $y = x^2 - x - 6$ (c) $y = x^2 + 6x + 9$

(d) $y = x^2 - 13x + 42$ (e) $y = x^2 + 5x - 36$ (f) $y = x^2 - 2x + 1$

(g) $y = x^2 + 5x + 11$ (h) $y = x^2 - 4x + 7$

Question 6: Sketch the following graphs.

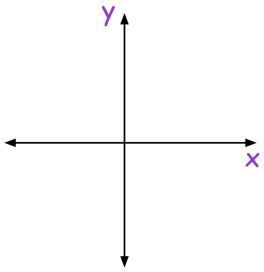
(a) $y = (x - 7)(x + 10)$ (b) $y = (x + 3)(x + 8)$ (c) $y = (x - 2)^2$

Question 7: Sketch the following graphs.

(a) $y = x^2 - 49$ (b) $y = x^2 - 1$ (c) $y = x^2 - 196$

Question 8: Michael wants to sketch the graph of $y = -x^2 + 5x + 14$

(a) Find the value of y when $x = 0$
(b) Use your answer to (a) to plot where the graph crosses the y–axis.
(c) Solve the equation $-x^2 + 5x + 14 = 0$
(d) Use your answers to (c) to help you plot where the graph crosses the x–axis.
(e) Sketch the graph of $y = -x^2 + 5x + 14$



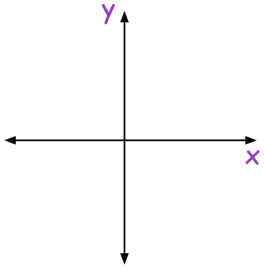
Question 9: Sketch the following graphs.

(a) $y = -x^2 - 5x - 4$ (b) $y = -x^2 + 9x - 18$ (c) $y = 84 - 5x - x^2$

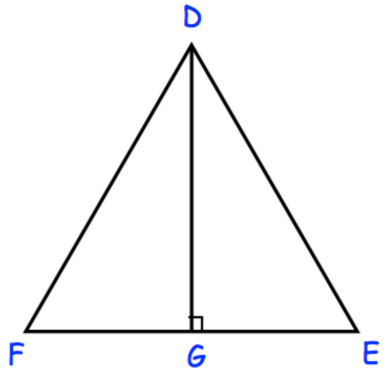
(d) $y = (3 - x)(x + 8)$ (e) $y = -x^2 - 8x - 16$ (f) $y = 144 - x^2$

Question 10: Robyn wants to sketch the graph of $y = 2x^2 + 9x + 4$

(a) Find the value of y when $x = 0$
(b) Use your answer to (a) to plot where the graph crosses the y–axis.
(c) Solve the equation $2x^2 + 9x + 4 = 0$
(d) Use your answers to (c) to help you plot where the graph crosses the x–axis.
(e) Sketch the graph of $y = 2x^2 + 9x + 4$



9. DEF is an equilateral triangle.

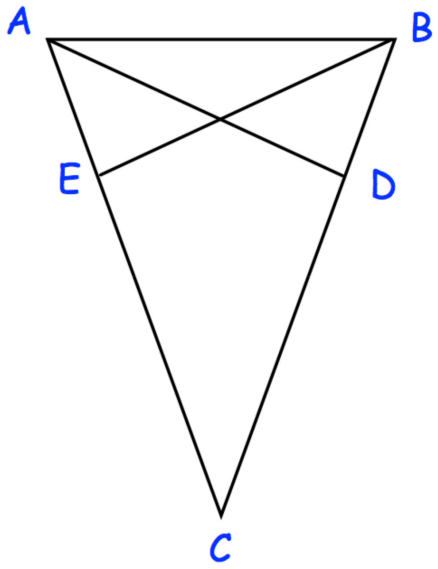


G lies on EF.
DG is perpendicular to FE.

Prove DFG is congruent to DEG.

(3)

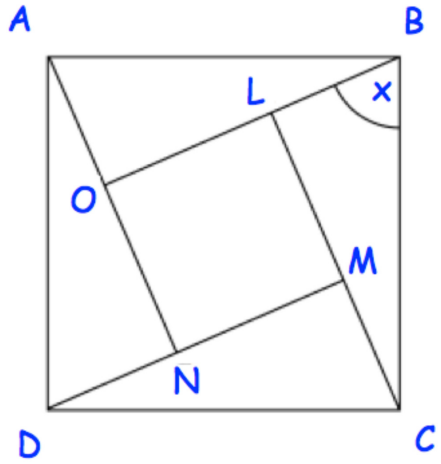
10. ABC is an isosceles triangle in which AC = BC.
D and E are points on BC and AC such that CE = CD.



Prove triangles ACD and BCE are congruent.

(4)

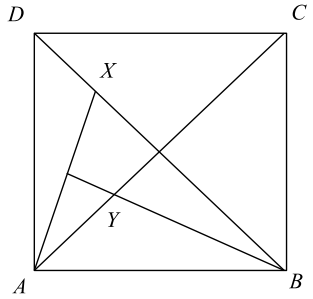
11. ABCD and LMNO are squares.
Angle CBL = x



Prove that triangles ABO and CBL are congruent.

(4)

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



Prove that triangles AXD and AYB are congruent.

(4)

Error Intervals

Video 377 on www.corbettmaths.com

Examples

Click here

Scan here

Workout

Question 1: The mass of a coin is 8 grams to the nearest gram.
Complete the error interval for the mass of the coin

..... g ≤ mass < ..... g

Question 2: The distance between two cities is 900km to the nearest 100km.
Complete the error interval for the distance

..... km ≤ distance < ..... km

Question 3: Frank rounds a number, y, to the nearest ten.
His result is 20
Write down the error interval for y

Question 4: Lily rounds a number, y, to the nearest whole number.
Her result is 5
Write down the error interval for y

Question 5: Freya rounds a number, y, to one decimal place.
Her result is 6.4
Write down the error interval for y

Question 6: Oscar rounds a number, y, to the nearest integer.
His result is 100
Write down the error interval for y

Question 7: A number, n, is rounded to 1 decimal place.
The result is 1.3
Using inequalities, write down the error interval for n.

Question 8: A number, n, is rounded to 2 decimal places.
The result is 6.27
Using inequalities, write down the error interval for n.

Question 9: Elliott weighs 56.2kg.
This mass, m, is to the nearest 100g.
Write the error interval due to rounding.

Error Intervals

Video 377 on www.corbettmaths.com

Question 10: A number, x, is 21 when rounded to 2 significant figures.
Write down the error interval.

Question 11: A number, y, is 15000 when rounded to 2 significant figures.
Write down the error interval.

Question 12: A number, y, is 680000 when rounded to 3 significant figures.
Write down the error interval.

Question 13: The length of a line, l, was given as 2.8cm, truncated to 1 decimal place.
Complete the error interval for l

..... $cm \leq l <$ ..... cm

Question 14: A number, y, is 0.37 when truncated to 2 decimal places.
Complete the error interval for y

..... $\leq y <$ .....

Question 15: A number, n, is truncated to 1 decimal place.
The result is 18.1
Using inequalities, write down the error interval for n.

Question 16: A number, n, is truncated to 3 decimal places.
The result is 4.066
Using inequalities, write down the error interval for n.

Apply

Question 1: The length of each side of a regular hexagon is 4.7cm to 1 decimal place.
Write the error interval for the perimeter, P

Question 2: Grace and George complete a crossword.
It takes Grace 9 minutes to complete the crossword to the nearest minute.
It takes George 11 minutes to complete the crossword to the nearest minute.

Show that the total time for both people to complete the crossword could be 20 minutes 50 seconds.

Question 3: A man jogs 200 metres to the nearest 10 metres.
It takes him 30 seconds to the nearest 10 seconds.

Work out the error interval for his speed, s.

Error Intervals

Video 377 on www.corbettmaths.com

Question 4: A number, x, is 1.92 when truncated to 2 decimal places.
Matthew has been asked to write down the error interval.
This is his answer.

$$1.915 \leq x < 1.925$$

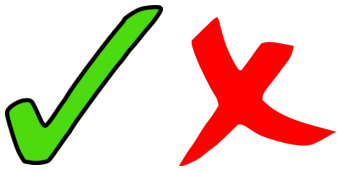
Explain why Matthew is wrong.

Question 5: A number, n, is rounded to 3 significant figures.
The result is 7500
Norris has been asked to write down the error interval for n.
This is his answer.

$$7450 < x < 7550$$

Explain why Norris is wrong.

Answers



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Box Plots

Videos 149 and 150 on www.corbettmaths.com

Question 4: Draw a box plot for each set of data

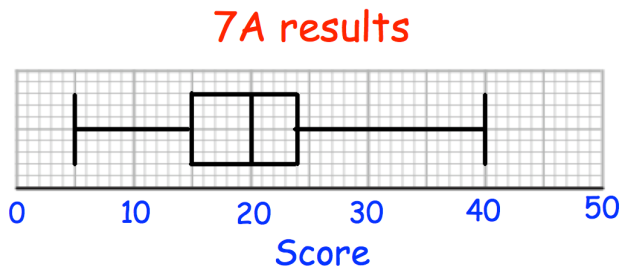
(a) 8, 10, 13, 14, 14, 15, 15, 16, 18, 19, 21, 22, 24, 29, 35

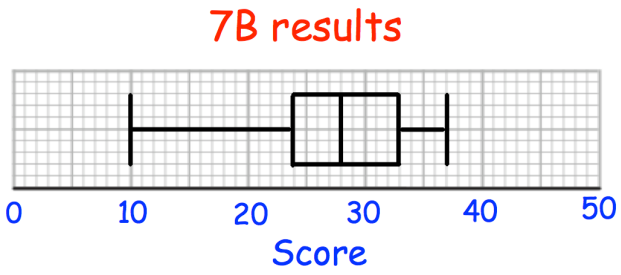
(b) 40, 80, 90, 90, 100, 120, 130

(c) 5.9, 7.3, 7.8, 8, 8.4, 8.7, 8.9, 8.9, 8.9, 9, 9, 9.1, 9.1, 9.3, 9.5, 9.6, 9.9, 10.5, 10.9

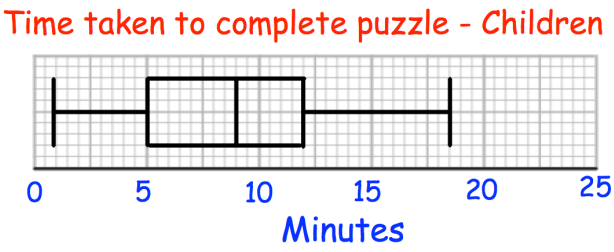
Question 5: Compare the distributions of each pair of box plots below.

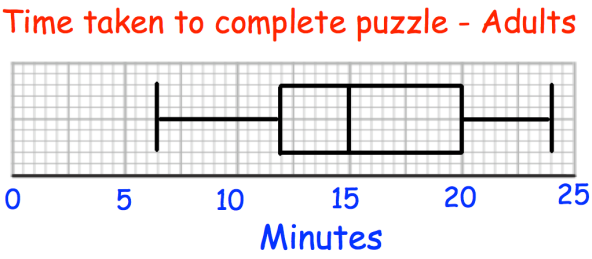
(a)





(b)





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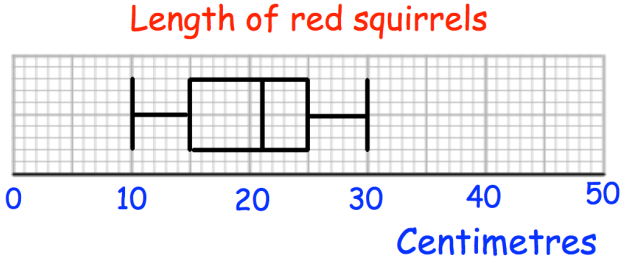
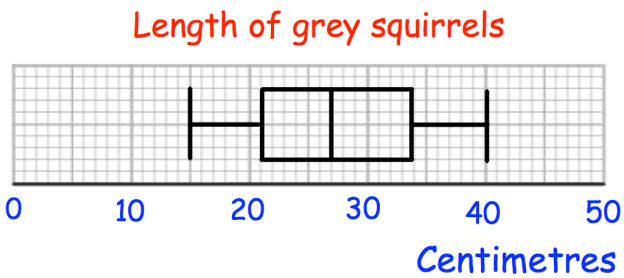
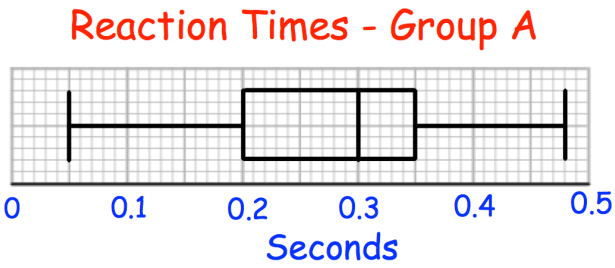
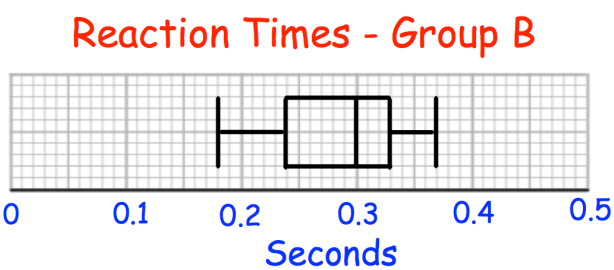




(d)





Box Plots

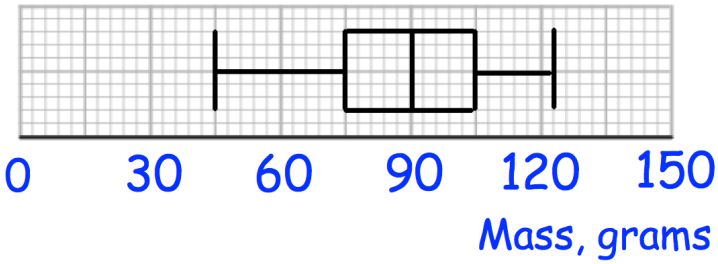
Videos 149 and 150 on www.corbettmaths.com

Question 3: Mr Jones is an estate agent on the Isle of Man.
He has created this table to show information about the prices of houses he has sold.

Explain how you know he has made a mistake.

Median	£375,000
Range	£235,000
Interquartile Range	£590,000

Question 4: The box plot show information about the masses of apples in a crate.



Jack is going to select apples at random from the crate.
After selecting each apple, he records its mass and returns it to the crate before picking another.
Work out the probability that:

(a) Jack picks two apples, both under 75g

(b) Jack picks two apples, both over 90g

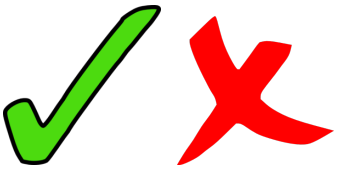
(c) Jack picks two apples, both over 105g

(d) Jack picks two apples, one under 90g and one over 105g

(e) Jack picks three apples, all over 105g

(f) Jack picks three apples, two over 105g and one under 75g.

Answers



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Product Rule for Counting

Video 383 on www.corbettmaths.com

Question 6: Oliver picks a 4-digit **even** number that is greater than 3000.
The second digit is a multiple of 4.

How many different numbers could Oliver pick?

Question 7: Sophia is creating a 6-digit code to lock her iPad.

She only uses digits greater than 2.
She only uses each digit once.

How many possible codes can Sophia create?

Question 8: In a class, there are 10 boys and 9 girls.
The teacher has been asked to pick one boy and one girl to win a prize.

How many possible pairs of students can the teacher pick?

Question 9: Jason picks a 5-digit number that is less that 80000.
The first digit is odd.
The fourth and fifth digits are equal.

How many different numbers can Jason pick?

Question 10: A headteacher wants to survey two Year 7 students.
There are 100 students in Year 7.

How many possible pairs of students can the headteacher pick?

Question 11: How many even numbers greater than 40000 can be created using these digits?

2	9	1	6	8

Apply

Question 1: On a school trip, students are given a packed lunch.
The students can choose one piece of fruit and one snack.
There are 8 different pieces of fruit and some different snacks.

Altogether there are 104 different ways to choose one piece of fruit and one snack

How many different snacks are there?

Product Rule for Counting

Video 383 on www.corbettmaths.com

Question 2: At a summer camp, children pick a morning, an afternoon and an evening activity.
There are 4 morning and 7 evening activities to pick from.

Altogether there are 224 different ways to choose their activities.

How many afternoon activities are there?

Question 3: In a gym there are

12 exercise classes on a Monday
13 exercise classes on a Wednesday
7 exercise classes on a Friday

Katie is going to attend either

a class on Monday and a class on Friday
or a class on Wednesday and a class on Friday
or a class on Monday, Wednesday and Friday

Work out how many different ways there are to pick which exercises classes Katie is going to attend.

Question 4: A group of 10 people enter a room.
Each person shakes hands, once, with all the other people in the room.

How many handshakes are there in total?

Question 5: A pizza parlour sells 9 different toppings.

Michael orders a pizza with 2 different toppings.

(a) How many different pizzas can he choose from?

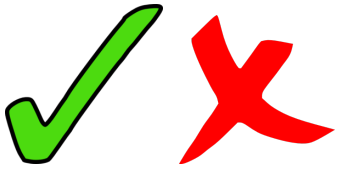
Beth orders a pizza with 3 different toppings.

(b) How many different pizzas can she choose from?

John orders a pizza with 4 different toppings.

(c) How many different pizzas can he choose from?

Answers

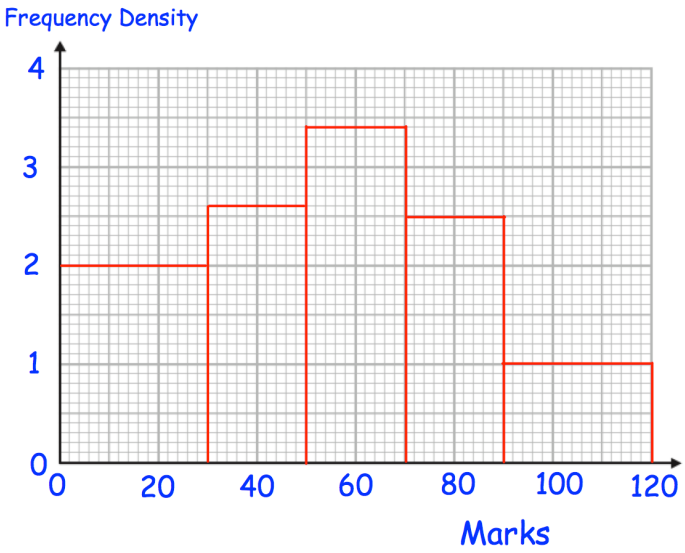


Click here

Histograms

Videos 158 and 159 on www.corbettmaths.com

Question 3: 260 people sit a driving theory test.
Their results are shown in this histogram.



10% of the people scored less than x marks.

(a) Find x.

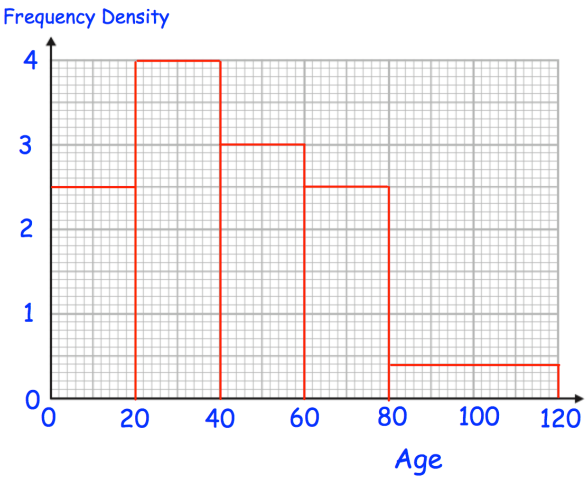
5% of people scored more than y marks.

(b) Find y

70% of people scored less than z marks.

(c) Find z

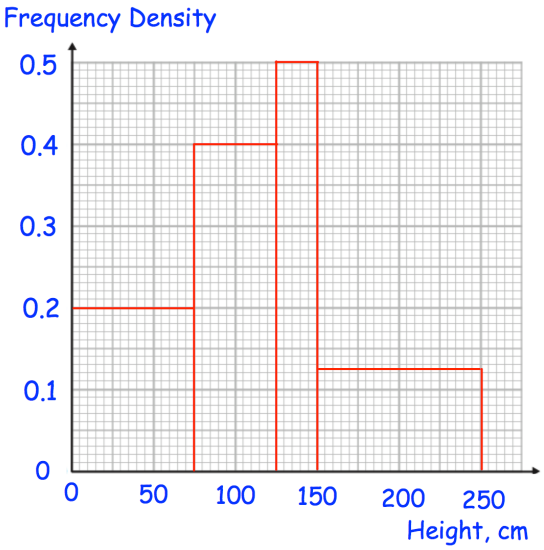
Question 4: The ages of the residents of a village are represented in this histogram



(a) How many people live in the village?

(b) Calculate an estimate of the mean age

Question 5: The heights of some sunflowers are represented in the histogram.



(a) Find an estimate of the median

(b) Find an estimate of the lower quartile

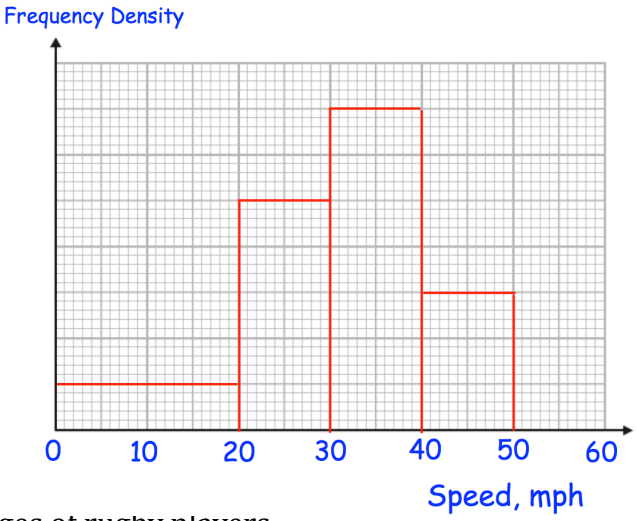
(c) Find an estimate of the upper quartile

(d) Find an estimate of the interquartile range

Histograms

Videos 158 and 159 on www.corbettmaths.com

Question 6: The histogram shows the speed, in miles per hour, of cars on a road over 1 hour. 24 cars travelled faster than 40mph.



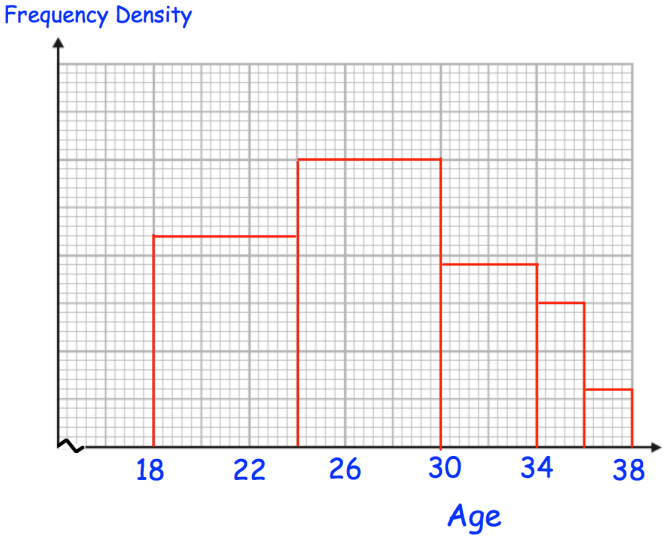
(a) How many cars travelled slower than 20mph?

(b) How many cars travelled between 20mph and 40mph?

(c) Estimate how many cars travelled between 15mph and 35mph.

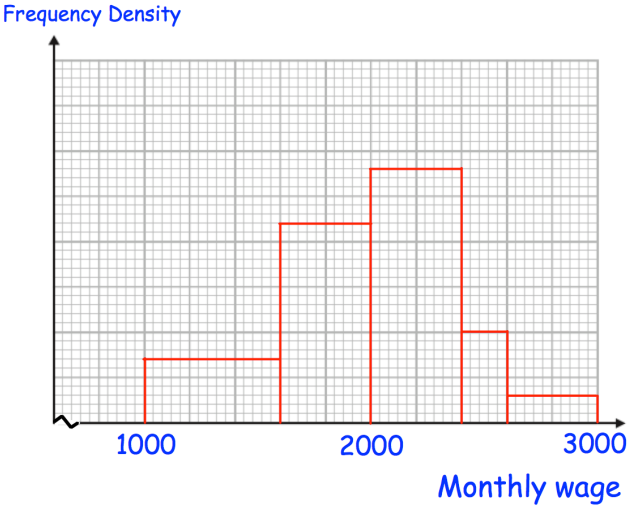
Question 7: The histogram below shows the ages of rugby players. There are 768 players that are under 26 years old.

Work out an estimate of how many players are over 32.



Question 8: The histogram below shows the monthly salaries of employees. There are 216 people who have a monthly salary of between £1800 and £2100.

Work out an estimate of how many employees have a salary of between £2300 and £2900

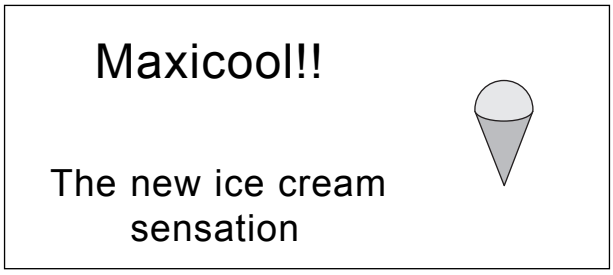


Answers

Click here

Scan here

1. **[4 marks]**



A Maxicool consists of a cone full of ice cream with a hemisphere of ice cream on top.
The radius of the hemisphere is 3 cm.
The radius of the base of the cone is 3 cm.
The height of the cone is 10 cm.

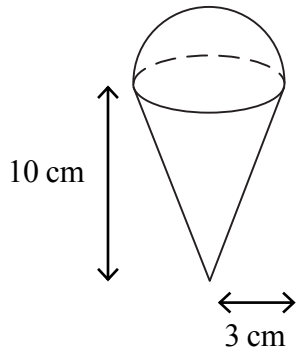


Diagram **NOT** accurately drawn

Calculate the total volume of ice cream in a Maxicool.
Give your answer correct to 3 significant figures.

Questions compiled by:
@Maths4Everyone

..... cm^2

2. **[5 marks]**

A solid is made from a cylinder and a hemisphere.
The cylinder has radius 1.5 cm and height 4 cm.
The hemisphere has radius 1.5 cm.

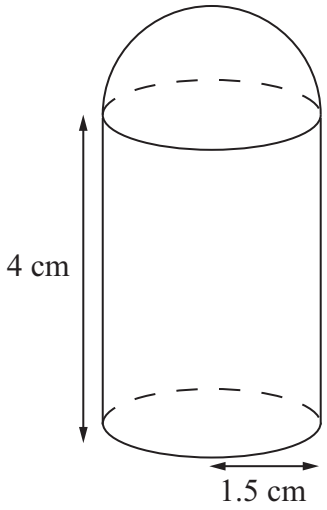


Diagram **NOT** accurately drawn

Work out the total volume of the solid.
Give your answer correct to 3 significant figures.

..... cm^3

3. **[4 marks]**

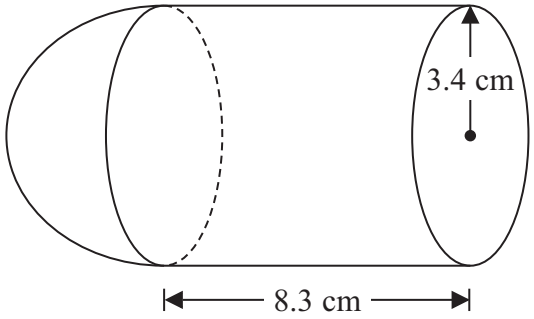


Diagram **NOT** accurately drawn

The diagram shows a shape made from a solid cylinder and a solid hemisphere.
The cylinder has a radius of 3.4 cm and a length of 8.3 cm.
The hemisphere has a radius of 3.4 cm.

Calculate the total surface area of the solid shape.
Give your answer correct to 3 significant figures.

..... cm^2

4. **[3 marks]**

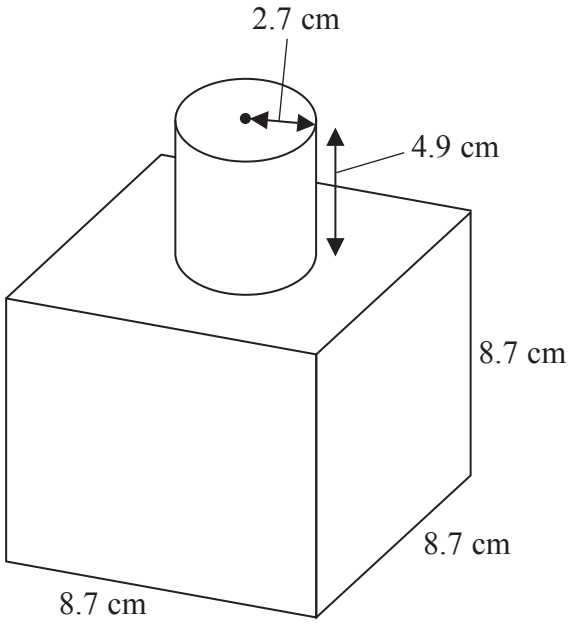


Diagram **NOT** accurately drawn

The diagram shows a shape made from a solid cube and a solid cylinder.
The cube has sides of length 8.7 cm.
The cylinder has a radius of 2.7 cm and a height of 4.9 cm.

Calculate the total surface area of the solid shape.
Give your answer correct to 3 significant figures.

..... cm^2

5. **[3 marks]**

The diagram shows a sphere and a cone.

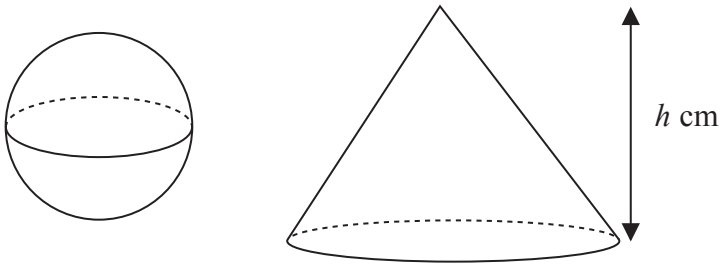


Diagram **NOT** accurately drawn

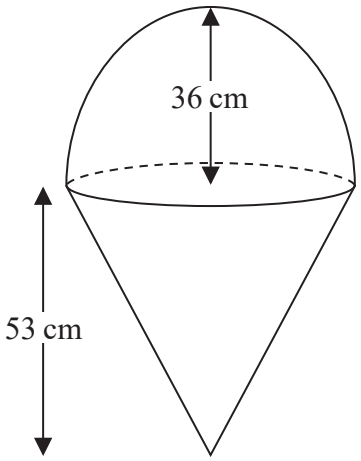
The cone has height h cm.
The radius of the base of the cone is 3 times the radius of the sphere.

Given that the volume of the sphere is equal to the volume of the cone, find an expression for the radius of the sphere in terms of h.
Give your expression in its simplest form.

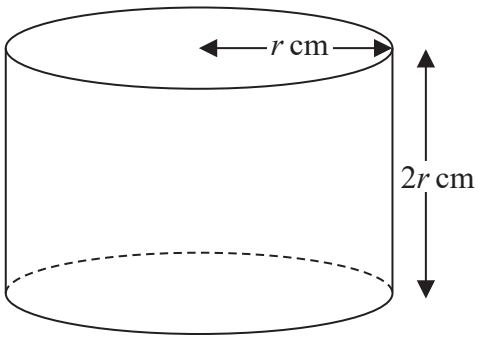
6. **[6 marks]**

The diagram shows two solid shapes, shape **A** and shape **B**.
Shape **A** is made of a hemisphere and a cone.
Shape **B** is a cylinder.

Diagram **NOT** accurately drawn



A



B

For shape **A**

radius of the hemisphere is 36 cm
radius of the base of the cone is 36 cm
height of the cone is 53 cm

For shape **B**

radius of the cylinder is r cm
height of the cylinder is $2r$ cm

The volume of shape **A** = the volume of shape **B**

Calculate the height of shape **B**.

7. **[4 marks]**

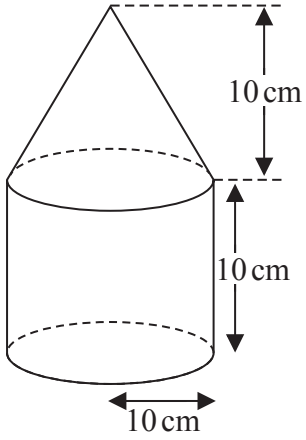


Diagram **NOT** accurately drawn

The diagram shows a solid shape made from a cone on top of a cylinder.

The cone has a radius of 10 cm and a height of 10 cm.
The cylinder has a radius of 10 cm and a height of 10 cm.
The centre of the base of the cone coincides with the centre of the top face of the cylinder.

The total surface area of the solid is A cm^2

Show that $A = (300 + 100\sqrt{2})\pi$

8. **[3 marks]**

The diagram shows a cylinder and a sphere.

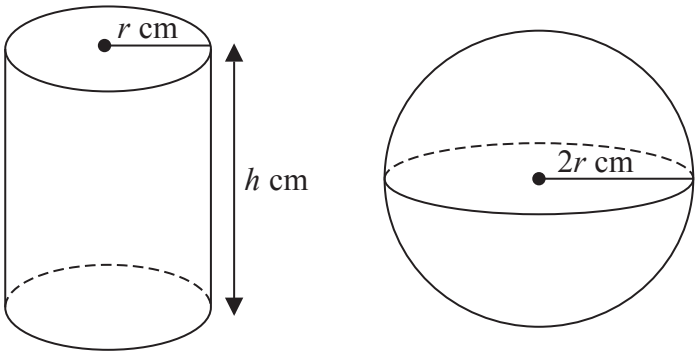


Diagram **NOT** accurately drawn

The cylinder has radius r cm and height h cm.
The sphere has radius $2r$ cm.

The volume of the cylinder is equal to the volume of the sphere.
Find an expression for h in terms of r.
Give your answer in its simplest form.

.....

9. **[5 marks]**

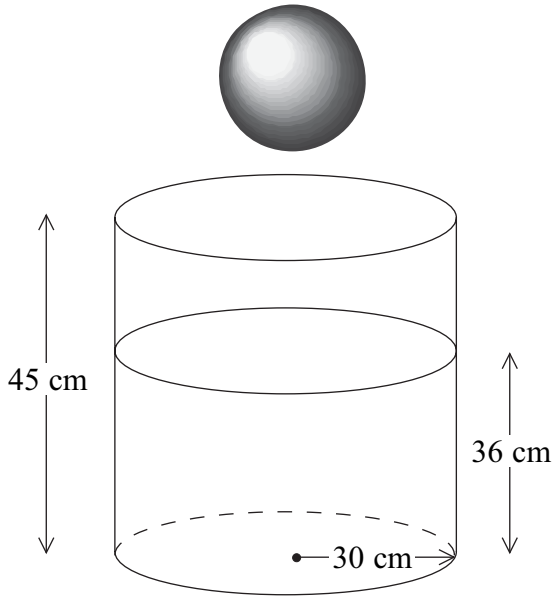


Diagram **NOT** accurately drawn

A cylindrical tank has a radius of 30 cm and a height of 45 cm.
The tank contains water to a depth of 36 cm.

A metal sphere is dropped into the water and is completely covered.
The water level rises by 5 cm.

Calculate the radius of the sphere.

..... cm

10. **[5 marks]**

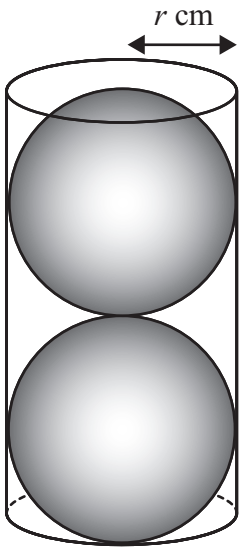


Diagram **NOT** accurately drawn

Two solid spheres, each of radius r cm, fit exactly inside a hollow cylinder.
The radius of the cylinder is r cm.
The height of the cylinder is equal to $4r$ cm.

The volume of the space inside the cylinder, not occupied by the spheres, is $\frac{125}{6}\pi$ cm^3

Calculate the value of r.

Show your working clearly.

$r =$ .....

11. **[5 marks]**

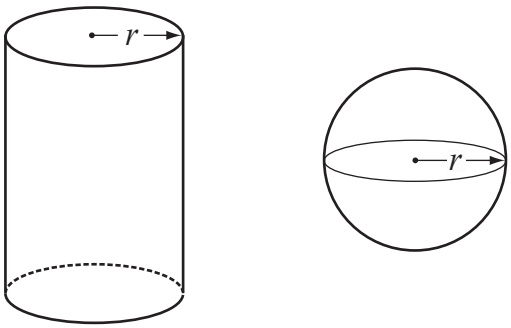


Diagram **NOT** accurately drawn

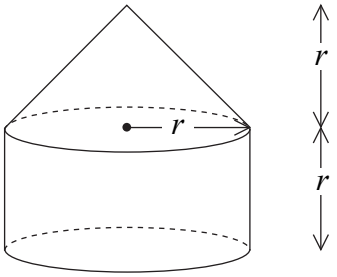
The diagram shows a solid cylinder and a solid sphere.
The cylinder has radius r.
The sphere has radius r.

Given that $\dfrac{\textbf{Total surface area of cylinder}}{\text{Surface area of sphere}} = 2$

find the value of $\dfrac{\text{Volume of cylinder}}{\text{Volume of sphere}}$

.....

12. **[5 marks]**



The diagram shows a solid made from a cone and a cylinder.
The cylinder has radius r and height r.
The cone has base radius r and height r.

(a) Show that the total volume of the solid is equal to the volume of a sphere of radius r.

(2)

The curved surface area of a cylinder with base radius r and height h is $2\pi rh$.
The curved surface area of a cone with base radius r and slant height l is πrl.

(b) Show that the **total** surface area of the above solid is greater than the surface area of a sphere of radius r.

(3)

C1 COORDINATE GEOMETRY *Worksheet A*

1 Find the gradient of the line segment joining each pair of points.

a (3, 1) and (5, 5) **b** (4, 7) and (10, 9) **c** (6, 1) and (2, 5) **d** (–2, 2) and (2, 8)

e (1, 3) and (7, –1) **f** (4, 5) and (–5, –7) **g** (–2, 0) and (0, –8) **h** (8, 6) and (–7, –2)

2 Write down the gradient and y-intercept of each line.

a $y = 4x - 1$ **b** $y = \frac{1}{3}x + 3$ **c** $y = 6 - x$ **d** $y = -2x - \frac{3}{5}$

3 Find the gradient and y-intercept of each line.

a $x + y + 3 = 0$ **b** $x - 2y - 6 = 0$ **c** $3x + 3y - 2 = 0$ **d** $4x - 5y + 1 = 0$

4 Write down, in the form $y - y_1 = m(x - x_1)$, the equation of the straight line with the given gradient which passes through the given point.

a gradient 2, point (4, 1) **b** gradient 5, point (2, –5)

c gradient –3, point (–1, 1) **d** gradient $\frac{1}{2}$, point (1, 6)

e gradient –2, point $(\frac{3}{4}, -\frac{1}{4})$ **f** gradient $-\frac{1}{5}$, point (–3, –7)

5 Find, in the form $y = mx + c$, the equation of the straight line with the given gradient which passes through the given point.

a gradient 3, point (1, 2) **b** gradient –1, point (5, 3)

c gradient 4, point (–2, –3) **d** gradient –2, point (–4, 1)

e gradient $\frac{1}{3}$, point (–3, 1) **f** gradient $-\frac{5}{6}$, point (9, –2)

6 Find, in each case, the equation of the straight line with gradient m which passes through the point P. Give your answers in the form $ax + by + c = 0$, where a, b and c are integers.

a $m = 1$, P (2, –4) **b** $m = \frac{1}{2}$, P (6, 1) **c** $m = -4$, P (–1, 8)

d $m = \frac{2}{5}$, P (–3, 5) **e** $m = -3$, $P\left(\frac{3}{2}, -\frac{1}{8}\right)$ **f** $m = -\frac{3}{4}$, $P\left(\frac{2}{3}, -7\right)$

7 Find, in the form $y = mx + c$, the equation of the straight line passing through each pair of points.

a (0, 1) and (4, 13) **b** (2, 9) and (7, –1) **c** (–4, 3) and (2, 7)

d $(-\frac{1}{2}, -2)$ and (2, 8) **e** (3, –2) and (18, –5) **f** (–3.2, 4) and (–2, 0.4)

8 Find, in the form $ax + by + c = 0$, where a, b and c are integers, the equation of the straight line which passes through each pair of points.

a (3, 0) and (5, 2) **b** (–1, 8) and (5, –4) **c** (–5, 3) and (7, 5)

d (–4, –1) and (8, –17) **e** (2, –1.5) and (7, 0) **f** $(-\frac{3}{5}, \frac{1}{10})$ and (3, 1)

9 The straight line l passes through the points A (–6, 8) and B (3, 2).

a Find an equation of the line l.

b Show that the point C (9, –2) lies on l.

10 The point M (k, $2k$) lies on the line with equation $x - 3y + 15 = 0$.

Find the value of the constant k.

C1 COORDINATE GEOMETRY *Worksheet C*

1 The straight line l has gradient -3 and passes through the point with coordinates $(3, -5)$.

a Find an equation of the line l.

The straight line m passes through the points with coordinates $(-1, -2)$ and $(4, 1)$.

b Find the equation of m in the form $ax + by + c = 0$, where a, b and c are integers.

The lines l and m intersect at the point P.

c Find the coordinates of P.

2 Given that the straight line passing through the points $A\ (2, -3)$ and $B\ (7, k)$ has gradient $\frac{3}{2}$,

a find the value of k,

b show that the perpendicular bisector of AB has the equation $8x + 12y - 45 = 0$.

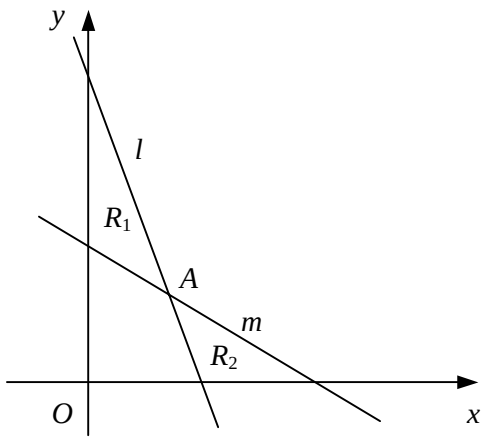
3 The vertices of a triangle are the points $A\ (5, 4)$, $B\ (-5, 8)$ and $C\ (1, 11)$.

a Find the equation of the straight line passing through A and B, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

b Find the coordinates of the point M, the mid-point of AC.

c Show that OM is perpendicular to AB, where O is the origin.

4



The line l with equation $3x + y - 9 = 0$ intersects the line m with equation $2x + 3y - 12 = 0$ at the point A as shown in the diagram above.

a Find, as exact fractions, the coordinates of the point A.

The region R_1 is bounded by l, m and the y-axis.

The region R_2 is bounded by l, m and the x-axis.

b Show that the ratio of the area of R_1 to the area of R_2 is $25 : 18$

5 The straight line l has the equation $2x + 5y + 10 = 0$.

The straight line m has the equation $6x - 5y - 30 = 0$.

a Sketch the lines l and m on the same set of axes showing the coordinates of any points at which each line crosses the coordinate axes.

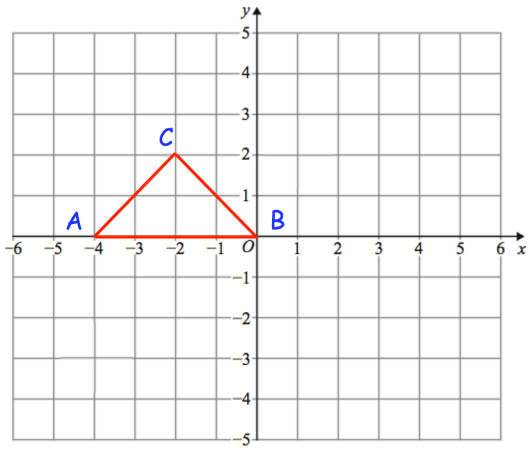
The points where line m crosses the coordinate axes are denoted by A and B.

b Show that l passes through the mid-point of AB.

Invariant Points

Video 392 on www.corbettmaths.com

Apply



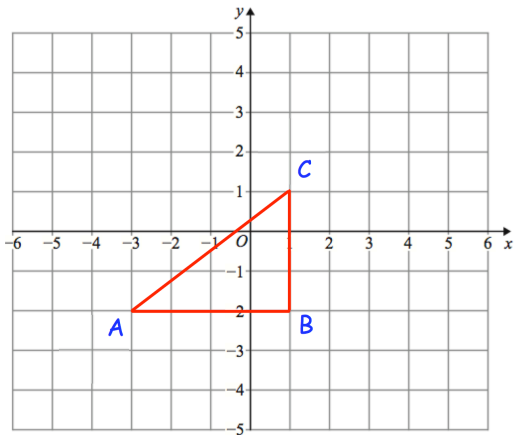
Question 1: ABC is a triangle.

Describe fully a **single** transformation of ABC so that:

(a) None of the vertices are invariant.

(b) Exactly one vertex is invariant.

(c) Exactly two vertices are invariant.



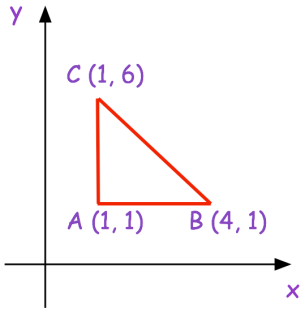
Question 2: Here is triangle ABC

Olivia says "if ABC is reflected in the line $x = -3$ there is one invariant point."

Amelia says "if ABC is reflected in the line $y = -2$ there are two invariant points."

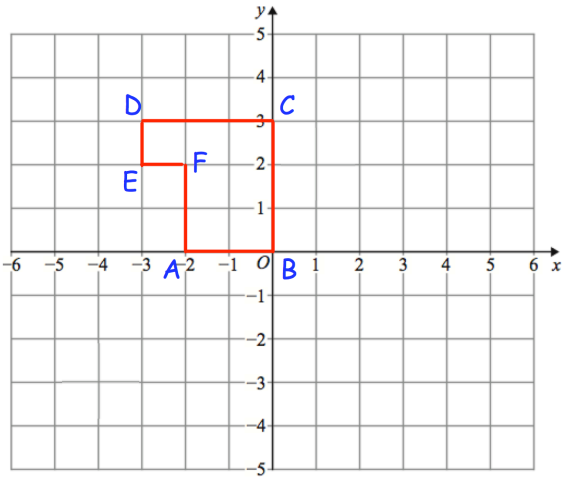
Isla says "if ABC is reflected in the line $x = 1$ there are two vertices that are invariant."

Which student is incorrect? Explain your answer.



Question 3: Here is a sketch of triangle ABC.

Describe fully a **single** transformation of ABC so that all the points on AC are invariant and the point B is not invariant.



Question 4: Here is shape ABCDEF

Describe fully **single** transformations so that from the six vertices:

(a) only vertices B and C are invariant.

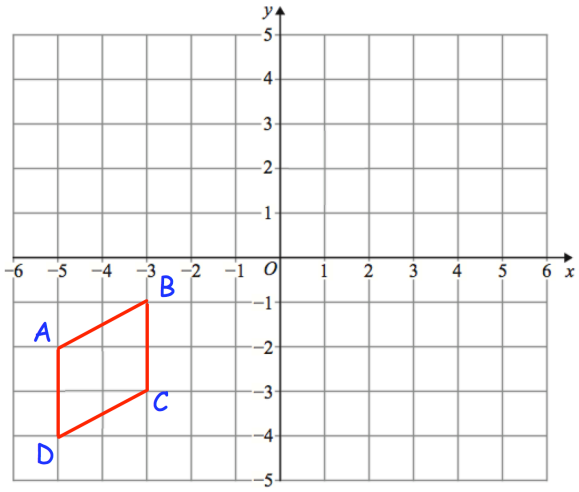
(b) only vertex F is invariant.

(c) only vertices B, D and F are invariant.

Invariant Points

Video 392 on www.corbettmaths.com

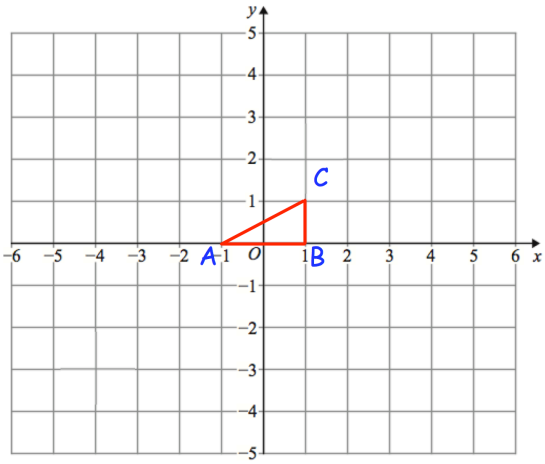
Question 5: Here is quadrilateral ABCD



ABCD is reflected in the line $x = -1$
followed by a reflection in the line $y = -x$
followed by a rotation of 180° about $(-1, -1)$

Which of the vertices are invariant?

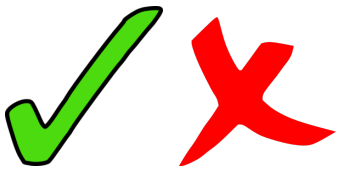
Question 6: Shown is triangle ABC



ABC is rotated 180° about $(-1, 2)$ and then translated by the vector $\begin{pmatrix} 2 \\ -4 \end{pmatrix}$

Write down the coordinate of the invariant point.

Answers



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GCSE MATHEMATICS REVISION PACK