

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:

- The bearing of A from B is 025° , find the bearing of B from A.
- The bearing of A from B is 061° , find the bearing of B from A.
- The bearing of A from B is 098° , find the bearing of B from A.
- The bearing of A from B is 102° , find the bearing of B from A.
- The bearing of A from B is 193° , find the bearing of B from A.
- The bearing of A from B is 222° , find the bearing of B from A.
- 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.



- Find the bearing of B from A.
- Find the bearing of A from B.

Use the scale 1cm represents 20miles.

- From your diagram, work out the real distance between A and B.

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

- On your diagram, mark C with a cross.

Changing the Subject: Advanced

Video 8 on www.corbettmaths.com

Question 3: Make c the subject of the following

(a) $w = \frac{ac}{a - c}$

(b) $w = 6 + \frac{a}{c + 2}$

Apply

Question 1: The cosine rule is $a^2 = b^2 + c^2 - 2bc \cos A$.
Make $\cos A$ the subject.

Answers



Click here



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Functions

Videos 369, 370 on Corbettmaths

Question 16: Given $g(x) = \frac{3x + 1}{2}$

- (a) Find $g^{-1}(x)$
(b) Calculate the value of $g^{-1}(11)$

Question 17: Given $f(x) = \frac{4x}{9} - 8$

- (a) Find $f^{-1}(x)$
(b) Calculate the value of $f^{-1}(-10)$

Apply

Question 1: Given $f(x) = 5x + 7$ and $g(x) = 3x - 18$

Find the value of a such that $f(a) = g(a)$

Question 2: Given $f(x) = x^2 + 9$ and $g(x) = x + 21$

Find the values of a such that $f(a) = g(a)$

Question 3: Given $f(x) = \frac{x + 1}{3}$ and $g(x) = \frac{2}{x + 2}$

Find the values of a such that $f(a) = g(a)$

Question 4: Given $f(x) = x^2 + 4x - 1$

Express the following in the form $ax^2 + bx + c$

- (a) $f(x + 2)$ (b) $f(x - 1)$ (c) $f(2x)$
(d) $f(3x)$ (e) $f(2x - 1)$ (f) $f(4x + 3)$

Functions

Videos 369, 370 on Corbettmaths

Question 5: The function f is such that $f(x) = kx + 7$

The function g is such that $g(x) = 3x - 2$

Given that $gf(1) = 34$

Work out the value of k

Question 6: The function g is such that $f(x) = \frac{kx + 2}{4}$

The function h is such that $g(x) = 2x + 5$

Given that $fg(4) = -9.25$

Work out the value of k

Question 7: For all values of x

$$f(x) = x^2 + 5$$

$$g(x) = x - 4$$

Solve $fg(x) = gf(x)$

Question 8: $f(x) = x^2 + 3x + 8$

Show that $f(x + 1) - f(x) = 2x + 4$

Answers



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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.

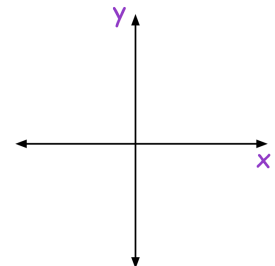
- | | | |
|---------------------------|--------------------------|---------------------|
| (a) $y = (x - 7)(x + 10)$ | (b) $y = (x + 3)(x + 8)$ | (c) $y = (x - 2)^2$ |
|---------------------------|--------------------------|---------------------|

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 $y = -x^2 + 5x + 14$

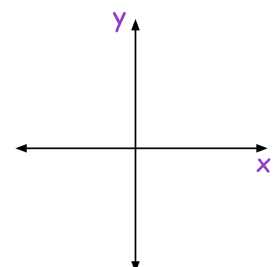


Question 9: Sketch the following graphs.

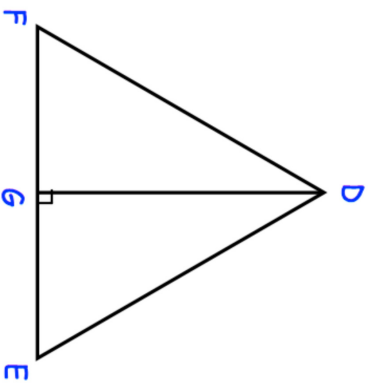
- | | | |
|--------------------------|--------------------------|-------------------------|
| (a) $y = -x^2 - 5x - 4$ | (b) $y = -x^2 + 9x - 18$ | (c) $y = 84 - 5x - x^2$ |
| (d) $y = (3 - x)(x + 8)$ | (e) $y = -x^2 - 8x - 16$ | (f) $y = 144 - x^2$ |

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 $y = 2x^2 + 9x + 4$



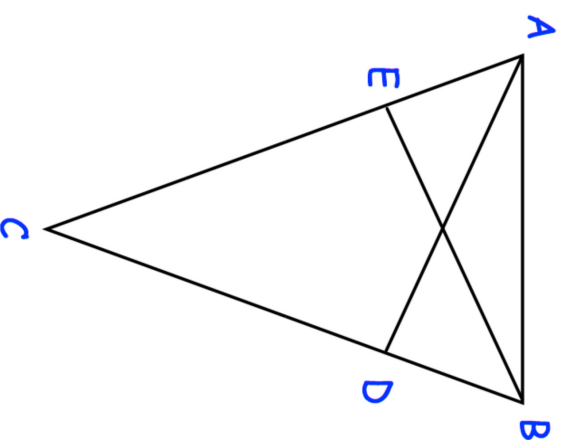
9. DEF is an equilateral triangle.



- G lies on EF.
DG is perpendicular to FE.
Prove $\triangle DFG$ is congruent to $\triangle DEG$.

(3)

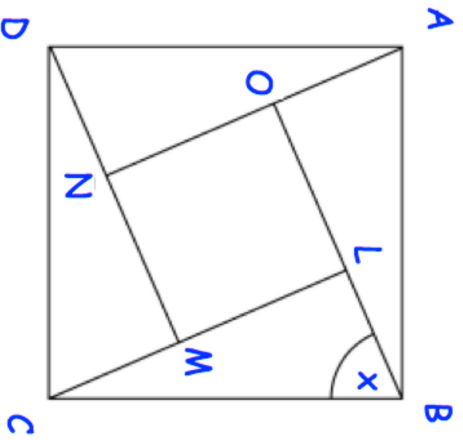
10. ABC is an isosceles triangle in which $AC = BC$.
D and E are points on BC and AC such that $CE = CD$.



- Prove triangles ACD and BCE are congruent.

(4)

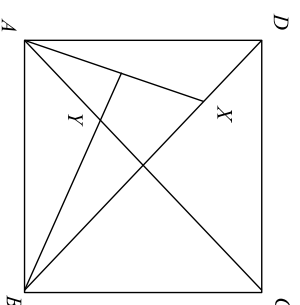
11. ABCD and LMNO are squares.
Angle CBL = x



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



Workout

Click here

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

$$\dots\dots\dots \text{g} \leq \text{mass} < \dots\dots\dots \text{g}$$

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

$$\dots\dots\dots \text{km} \leq \text{distance} < \dots\dots\dots \text{km}$$

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

$$\dots\dots\dots \text{ cm} \leq l < \dots\dots\dots \text{ cm}$$

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

$$\dots\dots\dots \leq y < \dots\dots\dots$$

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

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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.

$$1.915 \leq x < 1.925$$

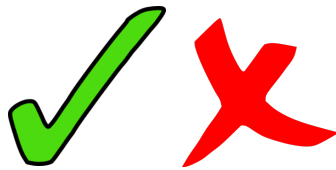
Explain why Matthew is wrong.

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



Click here



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Apply

Question 1: Paul has a deck of 50 cards, each with a shape on it.
The shapes are either red or black.

	Square	Rectangle	Kite
Red	17	6	1
Black	4	9	13

Paul picks a card at random.

- (a) What is the probability that the card has a black kite on it?
- (b) What is the probability that the card has a red shape on it?
- (c) What is the probability that the card has a square on it?
- (d) What is the probability that the card has a shape with at least 2 lines of symmetry?

Question 2: 60 people visited a swimming pool one evening.
13 out of the 19 people who wore goggles were adults.
There were 15 children.

- (a) Complete a two-way table for this information.
- (b) How many adults did not wear goggles?
- (c) What fraction of the children wore goggles?

Question 3: 100 families booked a holiday in July or in August, at a travel agents.
Some of the families booked to go to France.
Some booked to go to Spain.
The rest of the families booked a holiday to Portugal.

59 families booked to go on holiday in August.
19 of the 35 families going to France booked to go in July.
30 families booked to go to Portugal.
20 families booked to go to Spain in August.

- (a) Create a two-way table for this information.
- (b) How many families booked to go to Portugal in July?

Question 4: There are 120 students in Year 11 at a school.
Each student studies one language, either French, Spanish, German or Welsh.
21 of the 40 students studying Welsh are male.
18 males and 9 females study French.
12 of the 17 students studying Spanish are female.
Twice as many females study German than males.

How many students in Year 11 are female?

Two Way Tables

Video 319 on www.corbettmaths.com

Question 5: A teacher surveys 64 children on how they travelled to school.
 20 of the students were in Year 7.
 The teacher surveyed 30% more students in Year 9 than in Year 7.
 The rest of the students surveyed were in Year 11.
 75% of the students in Year 7 walked to school.
 8 more students in Year 9 walked to school than did not walk.
 Out of students surveyed, more Year 11 students walked to school than Year 9 students.

One of these students is picked at random

Write down the probability that the student chosen will walk to school.

Question 6: Isla has a box of counters.
 The table shows information about the shape and colours of the counters.

		Shape		
		Circle	Triangle	Square
Colour	Blue	6	2	5
	Red	8	9	11

Isla picks a counter at random, looked at it and then returned it to the box.

(a) Given it is a circular counter, what is the probability that it was red?

David picks a counter at random, looked at it and then returned it to the box.

(b) Given it is a blue counter, what is the probability that it was triangular?

Emily adds a number of red square counters to the box.

The probability of Emily picking a red square at random is now $\frac{2}{3}$

(c) How many red square counters did Emily add to the box?

Answers



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Box Plots

Videos 149 and 150 on www.corbettmaths.com

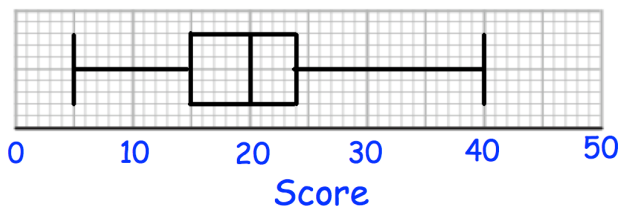
Question 4: Draw a box plot for each set of data

- (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.

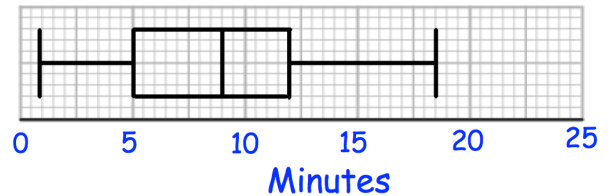
(a)

7A results

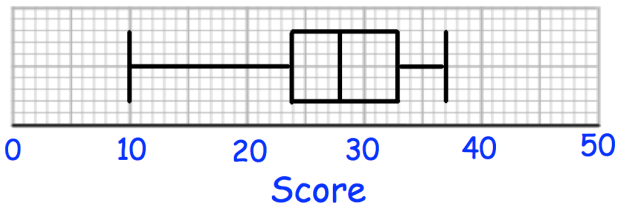


(b)

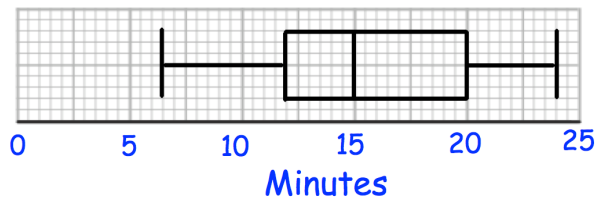
Time taken to complete puzzle - Children



7B results

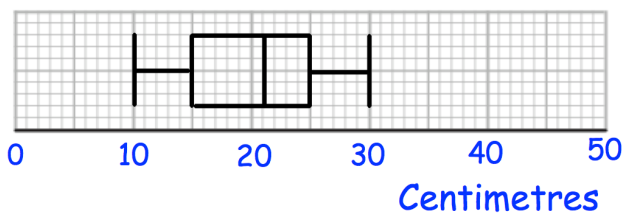


Time taken to complete puzzle - Adults



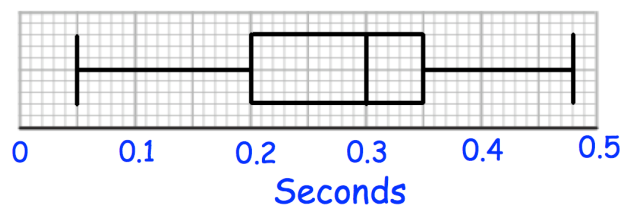
(c)

Length of red squirrels

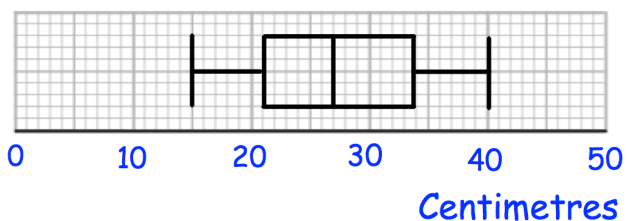


(d)

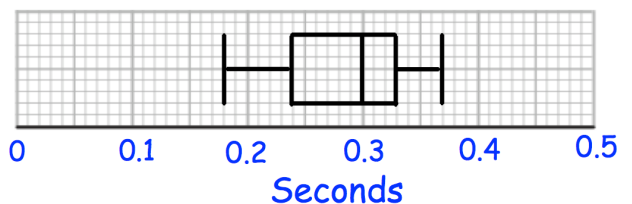
Reaction Times - Group A



Length of grey squirrels



Reaction Times - Group B



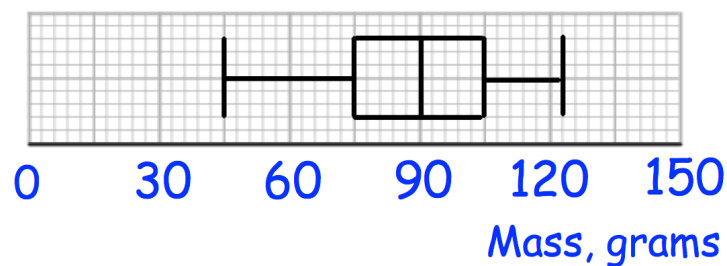
Box Plots

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:

- Jack picks two apples, both under 75g
- Jack picks two apples, both over 90g
- Jack picks two apples, both over 105g
- Jack picks two apples, one under 90g and one over 105g
- Jack picks three apples, all over 105g
- Jack picks three apples, two over 105g and one under 75g.

Answers



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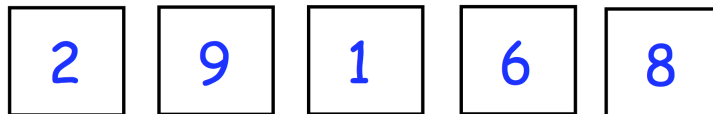


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Product Rule for Counting

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 than 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?



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

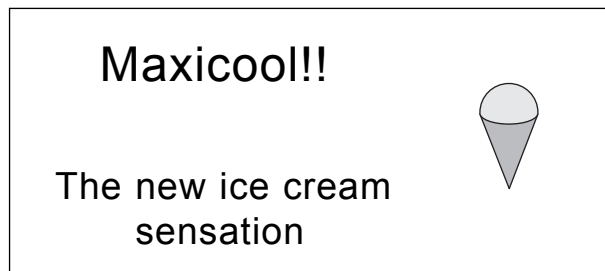


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1.

[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.

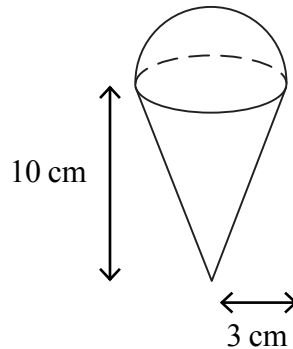


Diagram **NOT** accurately drawn

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

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.

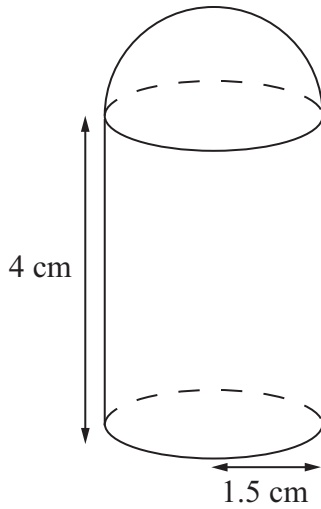


Diagram **NOT**
accurately drawn

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

..... cm³

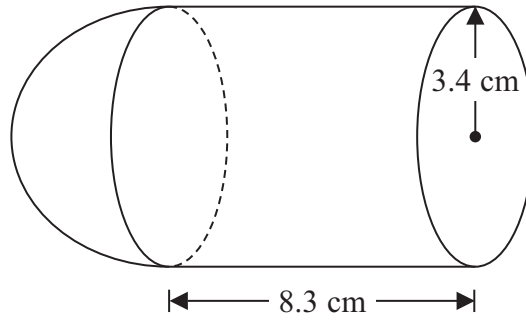


Diagram **NOT**
accurately drawn

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.

..... cm²

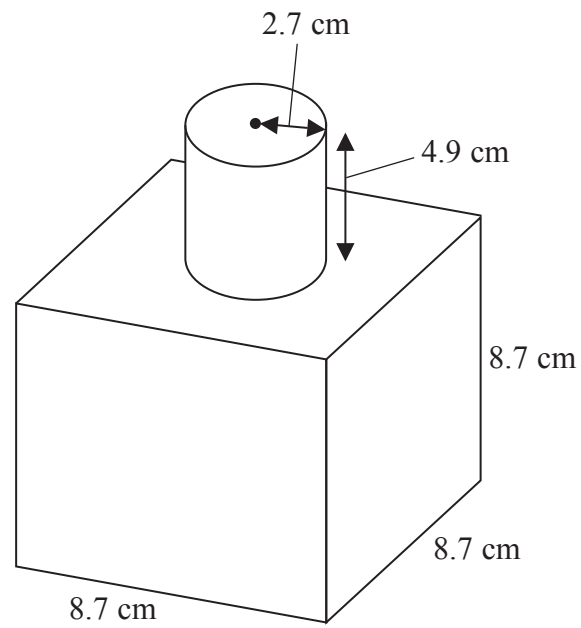


Diagram **NOT**
accurately drawn

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.

..... cm²

The diagram shows a sphere and a cone.

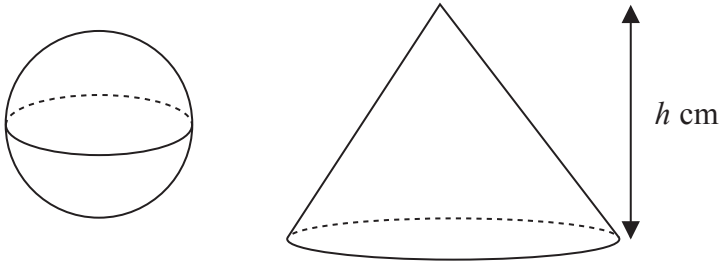


Diagram **NOT**
accurately drawn

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.

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.

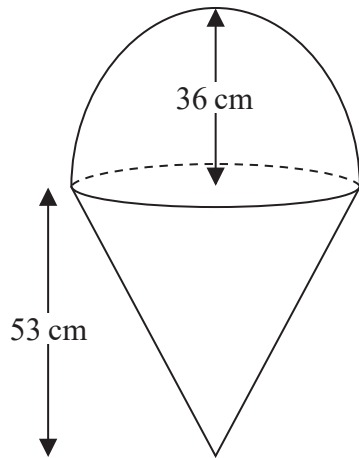
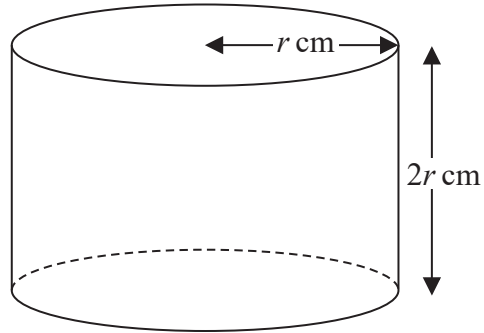
**A**

Diagram **NOT**
accurately drawn

**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**.

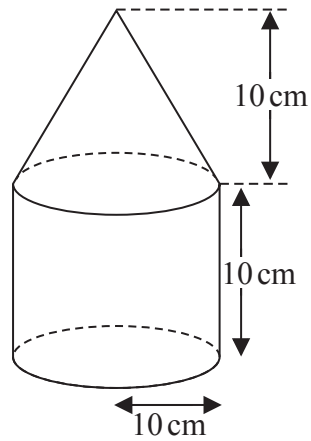


Diagram **NOT**
accurately drawn

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 $A \text{ cm}^2$

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

The diagram shows a cylinder and a sphere.

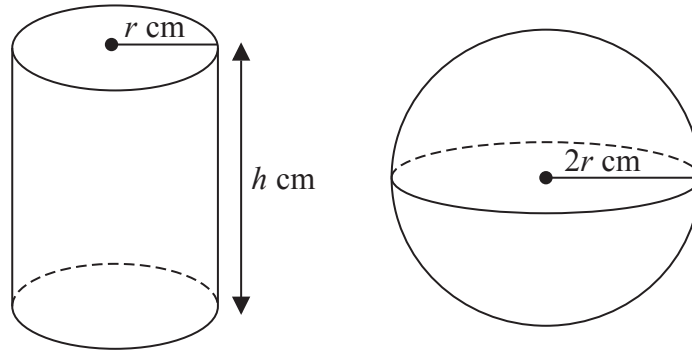


Diagram **NOT**
accurately drawn

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.

.....

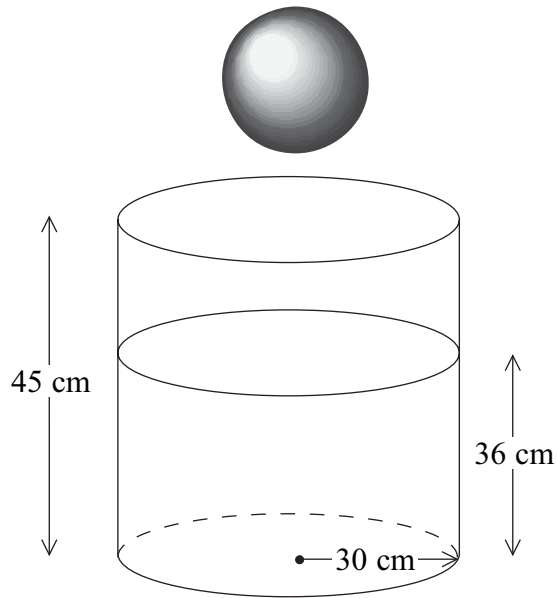


Diagram **NOT**
accurately drawn

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

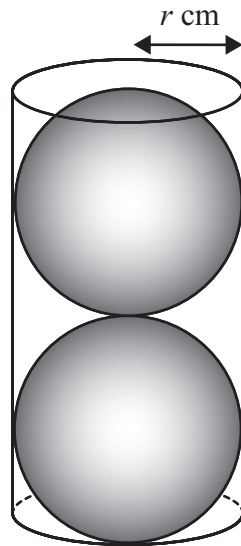


Diagram **NOT**
accurately drawn

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 $\frac{125}{6}\pi$ cm³

Calculate the value of r .

Show your working clearly.

$r = \dots\dots\dots$

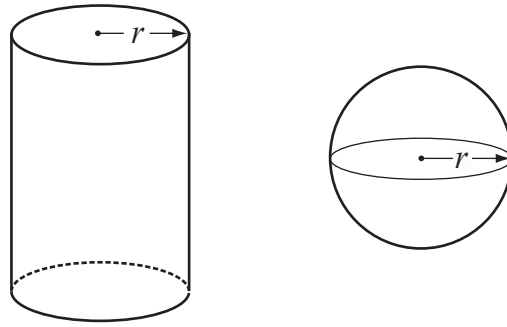


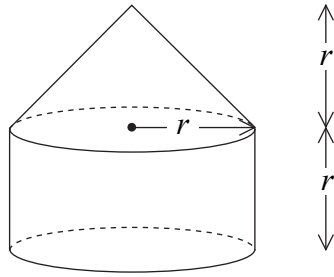
Diagram **NOT**
accurately drawn

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

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

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

.....



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)

Applying Limits of Accuracy

Video 184 on www.corbettmaths.com

Question 8: A rectangular football pitch has a width of 72m, measured to the nearest metre. The length of the pitch is 105m, measured to the nearest 5 metres.

Work out the lower bound for the perimeter of the pitch.

Question 9: The lengths of time taken for 4 people to complete a puzzle are listed below. Each time is given to one decimal place.

20.8 seconds 35.1 seconds 19.7 seconds 41.3 seconds

- (a) Work out the greatest possible range
(b) Work out the smallest possible mean.

Question 10: Mr Rodgers wants to keep 28 new maths textbooks on a shelf in his classroom. Each book has a mass of 700g correct to 1 significant figure. The shelf can hold up to 20kg to the nearest kilogram. Can the shelf safely hold the textbooks?

Question 11: The base of a triangle is 30cm, correct to 2 significant figures. The height of the triangle is 40cm, correct to 1 significant figure. Calculate the upper bound for the area of the triangle

Question 12: Kelly drove a distance of 120 miles, to the nearest 10 miles, in a time of 2 hours, to the nearest hour. Work out the difference between Kelly's greatest possible and lowest possible average speed.

Question 13: Rosie is buying strawberries, apples and grapes for a picnic. She buys 4kg of strawberries and 3kg of grapes, both to the nearest kilogram. Rosie buys 50 apples to the nearest 10 apples. A kilogram of strawberries costs £1.20 to the nearest 10p. A kilogram of grapes costs £1.30 to the nearest 10p. An apple costs 20p each to the nearest 10p. Work out the upper bound for the amount of money Rosie would have to pay

Question 14: A circle has an area of 600cm^2 to 2 significant figures. Work out the lower bound of the radius.

Question 15: $w = aT$
Given $a = 15$ correct to 2 significant figures
and $w = 700$ correct to 2 significant figures
Calculate the upper bound for T

Applying Limits of Accuracy

Video 184 on www.corbettmaths.com

Question 16: Shane estimated the distance between Cardiff and Swansea is 40 miles and that his average driving speed would be 60 mph.

He estimated the distance to the nearest 5 miles and the speed to the nearest 10mph.

Calculate the upper bound for the time the journey should take.
Give your answer to the nearest minute.

Question 17: A solid metal sphere has a radius of 4cm to 1 significant figure.
The sphere has a mass of 1200g to 2 significant figures.

Work out the lower bound for the density of the metal.

Question 18: The final velocity of a traveling object is given by the formula, $v = u + at$

where v is the final velocity
 u is the initial velocity
 a is the acceleration
and t is the time.

Given $u = 5.4\text{m/s}$ correct to 1 decimal place
 $a = 4.9\text{m/s}^2$ correct to 1 decimal place
 $v = 25.32$ correct to 2 decimal places

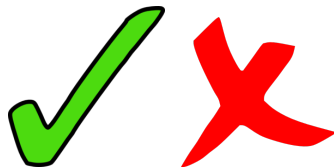
Calculate the upper bound for t .

Question 19: The population of a country is 6.4×10^6 to the nearest hundred thousand

The area of country is $8.4 \times 10^4 \text{ km}^2$ to the nearest 100km^2

Calculate the lower bound of the population density.

Answers



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- 1 The number of rabbits in a field t days from now is P where

$$P_0 = 220$$

$$P_{t+1} = 1.15(P_t - 20)$$

Work out the number of rabbits in the garden 3 days from now.

(3 marks)

- 2 The number of people living in a town t years from now is P where

$$P_0 = 55000$$

$$P_{t+1} = 1.03(P - 800)$$

Work out the number of people in the town 3 years from now.

(3 marks)

- 3 Using $x_{n+1} = 3 + \frac{9}{x_n^2}$

With $x_0 = 3$

Find the values of x_1 , x_2 and x_3 .

(3 marks)

- 4 Using $x_{n+1} = \frac{5}{x_n^2 + 3}$

With $x_0 = 1$

Find the values of x_1 , x_2 and x_3 .

(3 marks)

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

(3 marks)

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

(3 marks)

- 7 Using $x_{n+1} = \frac{5}{x_n^2} + 2$

With $x_0 = 2.5$

- (a) Find the values of x_1 , x_2 and x_3

(3)

- (b) Explain the relationship between the values of x_1 , x_2 and x_3 and the equation

$$x^3 - 2x^2 - 5 = 0$$

(2)

(5 marks)

- 8 (a) Show that the equation $2x^3 - x^2 - 3 = 0$ has a solution between $x = 1$ and $x = 2$.

(2)

- (b) Show that the equation $2x^3 - x^2 - 3 = 0$ can be rearranged to give: $x = \sqrt{\frac{3}{2x-1}}$

(1)

- (c) Starting with $x_{y^2} = 1$, use the iteration formula $x = \sqrt{\frac{3}{2x-1}}$ twice to find an estimate for the solution to $2x^3 - x^2 - 3 = 0$

(3)

(6 marks)

9 Using $x_{n+1} = 1 + \frac{1}{x_n^2}$

With $x_0 = 2$

(a) Find the values of x_1 , x_2 and x_3

(3)

(b) Explain the relationship between the values of x_1 , x_2 and x_3 and the equation $x^3 - x^2 - 1 = 0$

(2)

(5 marks)

10 (a) Show that the equation $x^3 + 4x = 1$ has a solution between $x = 0$ and $x = 1$.

(2)

(b) Show that the equation $x^3 + 4x = 1$ can be rearranged to give: $x = \frac{1}{4} - \frac{x^3}{4}$

(1)

(c) Starting with $x = 0$, use the iteration formula $x_{n+1} = \frac{1}{4} - \frac{x_n^3}{4}$ twice to find an estimate for the solution to $x^3 + 4x = 1$

.....
(3)

(6 marks)

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**GCSE MATHEMATICS
REVISION PACK**