

Number

List all of the integers that satisfy the inequalities:

$$2 < a < 7$$

$$-3 \leq b < 2$$

$$-5 < c \leq 0$$

$$16 \leq d \leq 22$$

Complete the table of equivalent fractions, decimals and percentages. Write fractions in their simplest form.

Fraction	Decimal	Percentage
$\frac{1}{10}$	0.1	10%
$\frac{1}{100}$	0.01	1%
	0.3	
		35%
$\frac{31}{100}$		
		22%
	0.68	
		81%
		42%
$\frac{9}{25}$		

Cross out the answers to the questions in the grid below.

- a. The factors of 16
- b. The factors of 7
- c. The first 3 multiples of 8
- d. The first 4 multiples of 9
- e. The HCF of 18 and 24
- f. The LCM of 6 and 10

You should have 3 numbers left.
Find the HCF of them.

1	18	120	4
36	6	30	7
60	2	9	24
16	100	8	27

Increase 200 by 12%
Decrease 4500 by 41%
Increase 900 by 33%

James invests £500 at a rate of 10% compound interest per year.
How much does James have after 2 years?

The value of a car depreciates by 20% each year. It was worth £8000 when it was bought 2 years ago.
How much is it worth now?

Write the following as products of prime factors:

18

20

45

Calculate:

- a. $\frac{1}{5} + \frac{2}{5}$
- b. $\frac{2}{9} + \frac{4}{9}$
- c. $\frac{5}{12} - \frac{3}{12}$
- d. $\frac{3}{6} + \frac{4}{12}$
- e. $\frac{7}{10} - \frac{2}{5}$
- f. $\frac{2}{7} + \frac{3}{5}$
- g. $\frac{8}{11} - \frac{1}{3}$
- h. $\frac{7}{10} + \frac{3}{8}$

Calculate:

- a. $\frac{3}{7} \times \frac{2}{6}$
- b. $\frac{2}{11} \times \frac{5}{8}$
- c. $\frac{9}{14} \times \frac{3}{2}$
- d. $\frac{4}{9} \times \frac{2}{13}$
- e. $\frac{4}{7} \div \frac{8}{9}$
- f. $\frac{2}{15} \div \frac{6}{7}$
- g. $\frac{5}{12} \div \frac{2}{5}$
- h. $\frac{7}{15} \div \frac{4}{11}$

1. Divide 150 in the ratio 7:8.

2. Divide 72 in the ratio 2:1.

3. Divide 143 in the ratio 4:6:3.

Write 125000 in standard form
Write 0.00025 in standard form
Calculate $(4 \times 10^4) \times (5 \times 10^6)$
writing your answer in standard form.
Calculate $(8 \times 10^4) \div (4 \times 10^9)$
writing your answer in standard form.

Number Exam Questions

A gym has 275 members.

- 40% are bronze members.
- 28% are silver members.
- The rest are gold members.

Work out the number of gold members.

Here are two offers for batteries.

OFFER A

Pack of 4

£2.52

$\frac{1}{3}$ off

OFFER B

Pack of 5

£2.75

Pay for 3 packs get 1 free

Zak wants to buy 40 batteries.

Which is the cheaper offer?
You **must** show your working.

Kamil looks at two cars.

- The normal price of Car A is £1550
- The normal price of Car B is £1950

The cars are part of this offer.

Cars up to £1800

Sale price

20% off the normal price

Cars over £1800

Sale price

$\frac{1}{3}$ off the normal price

Special Offer

When the sale price is over £1250

Get an extra 5% off the sale price

After all reductions, which car is cheaper, Car A or Car B?
You **must** show your working.

Standard Form and Reverse %

$$R = \frac{x^2}{y}$$

$$x = 3.6 \times 10^5$$

$$y = 7.5 \times 10^4$$

Work out the value of R .

Give your answer in standard form to an appropriate degree of accuracy.

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Answer

In a sale, a TV is reduced in price by 20%.
The sale price is £280.
After the sale, the price goes back to the original price.
Matt has £340 to spend.

Can he afford the TV when it goes back to its original price?

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(a) Write 0.000 583 in standard form.

.....

Answer

(1)

(b) Write 9.416×10^5 as an ordinary number.

.....

Answer

(1)

(c) Divide 7200 million by 300
Give your answer in standard form.

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.....

Answer

(3)

Algebra

Factorise the expressions:

1. $2x + 6$
2. $3t + 15$
3. $7p - 28$
4. $8a + 2$

Use FOIL to simplify the expressions:

1. $(x+4)(x+6)$
2. $(p+3)(p+4)$
3. $(t+5)^2$

Solve the equation

$$\begin{aligned} 3a + 2 &= 17 \\ 4b - 5 &= 35 \\ 2c + 8 &= 20 \\ 11d - 12 &= 43 \\ 6e + 15 &= 87 \\ 4f + 17 &= -7 \\ \frac{2g}{5} &= 6 \end{aligned}$$

Simplify by expanding the brackets:

1. $3(x + 1)$
2. $6(a - 5)$
3. $9(h + 4)$
4. $2(3c + 7)$
5. $9(5k + 3)$
6. $11(6 + 4j)$
7. $4d(d + 5)$
8. $7g(2g + 8)$
9. $3(p + 8) + 4p$
10. $3(j + 5) + 2(j - 2)$

Solve the equations:

$$\begin{aligned} 5a + 7 &= 19 - 3a \\ 8b + 5 &= 2b + 29 \\ 7 + 3c &= 17 + c \\ 6d - 12 &= 2d + 20 \\ 4e - 18 &= e + 5 \\ 7f - 15 &= 4f - 8 \end{aligned}$$

Represent the inequalities on the number lines:



Simplify:

$$\begin{aligned} a^5 \times a^6 \\ 2c^2 \times c^9 \\ f^8 \div f^2 \\ 6h^8 \div 3h^5 \\ \frac{4j \times 3j^6}{2j^3} \end{aligned}$$

$$\begin{aligned} b^4 \times b^7 \\ 3d^4 \times 8d^5 \\ g^{61} \div g^{42} \\ 42i^9 \div 6i^3 \\ \frac{6k \times 7k^9}{3k^5} \end{aligned}$$

Solve the following Simultaneous equations:

- 1) $\begin{aligned} 2x + 3y &= 13 \\ 4x + 4y &= 20 \end{aligned}$
- 2) $\begin{aligned} 3x + 2y &= 23 \\ 5x - y &= 8 \end{aligned}$

Make x the subject of the formulae:

- a. $y = x + 2$
- b. $y = 3x$
- c. $y = \frac{x}{4}$
- d. $y = 2x + 4$
- e. $y = 3x - 7$
- f. $y = 9x + 17$
- g. $y = 2x + 3z$

Find the nth term of each sequence:

- a. 4, 8, 12, 16, 20
- b. 4, 7, 10, 13, 16
- c. 6, 13, 20, 27, 34
- d. 3, 14, 25, 36, 47
- e. 9, 17, 25, 33, 41
- f. 6, 11, 16, 21, 26
- g. 8, 6, 4, 2, 0

Algebra exam questions

(a) Solve $6x = 54$

.....
 $x =$

(b) Solve $3y + 15 = 9$

.....
.....
 $y =$

(c) Solve $4w + 2 = 2w + 7$

.....
.....
.....

(a) Solve $\frac{x}{5} = -6$

.....
Answer $x =$

(a) Simplify $a^{20} \times a^5$

(b) Simplify $\frac{a^{20}}{a^5}$

(c) Simplify $(a^{20})^5$

A, B, C and D represent different numbers.
The total for each row is shown.

				Total
A	A	A	A	24
A	A	B	B	22
A	B	B	C	26
A	B	C	D	28

Work out the values of A, B, C and D.

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.....

Here is a linear sequence.

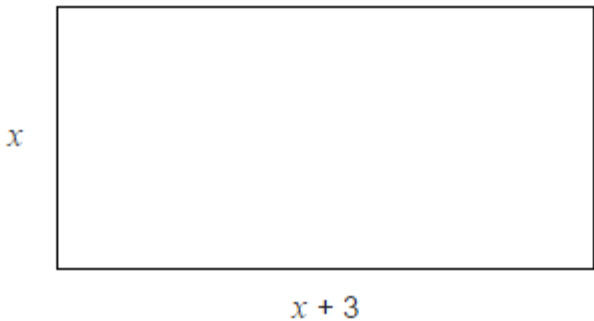
46 40 34 28 22

Work out the n th term of the sequence.

.....
.....

Answer

The perimeter of the rectangle is 37 cm.



Answer

Answer

Work out the value of x .

.....

(b) Factorise fully $4t - 20$

.....
Answer

Solid algebra exam questions

(a) A sequence starts 5 13 21 29

Circle the expression for the n th term.

$8 - 3n$ $8n + 5$ $8n - 3$ $5n + 8$

(b) The term-to-term rule for a different sequence is

Multiply the previous term by 2 then subtract 5

The second term in this sequence is $2x + 7$

The sum of the first three terms is 57

Work out the value of x .

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.....

.....

Solve the simultaneous equations

$$5x + 6y = 3$$

$$2x - 3y = 12$$

Do **not** use trial and improvement.

You **must** show your working.

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(a) Expand and simplify $(3x + 2)(2x + 5)$

.....

.....

.....

Answer

(b) Simplify fully $(3x^2y^4)^2$

.....

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Circle the equation with roots 4 and -8

(a) Expand and simplify $(2x + 1)(x - 3)$

.....

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Answer

(b) Factorise $y^2 + 2y - 24$

$$4x(x - 8) = 0$$

$$(x - 4)(x + 8) = 0$$

$$x^2 - 32 = 0$$

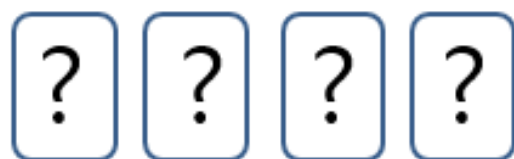
$$(x + 4)(x - 8) = 0$$

Handling Data

Number of Siblings	Frequency
0	5
1	7
2	8
3	4
4	2
5	1

From the frequency diagram calculate the:

- Mean
- Median
- Mode
- Range



You have 4 cards. Write down the numbers that could be on the cards so that:

- They have a range of 8
- They have a median of 6.

They have a mode of 7 and a range of 5.
They have a mean of 8 and a range of 10.

1. A fair dice is rolled twice. Find the probability of:

- Rolling a 5 and then a 6.
- Rolling an even number and then a 4.
- Rolling an odd number and then a prime number.

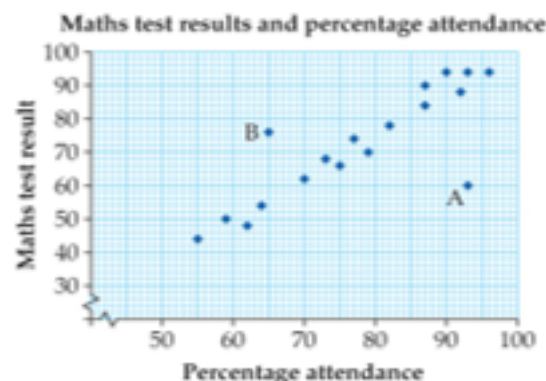
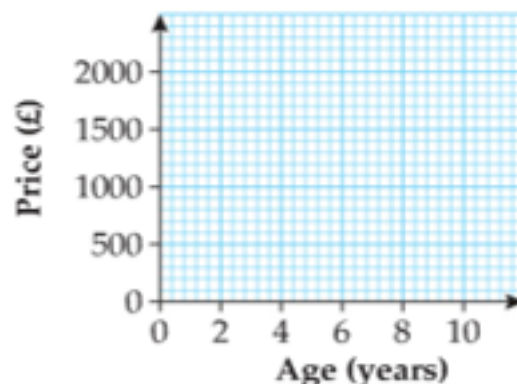
I choose counters from a bag containing 2 red, 2 blue, 2 green, and 2 yellow counters. Complete the table to find the relative frequencies.

Number of trials	100	200	300	400	500
Number of reds	14	34	81	92	120
Relative frequency					

Calculate the theoretical probability of picking a red counter.

Age (years)	2	6	2	3	4	5	4	7	9	8
Price (£)	1300	1000	1800	1600	1200	1000	1400	600	200	400

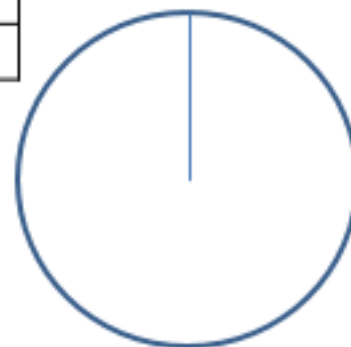
The table shows some information about the age and price of some motorbikes. Draw a scatter diagram for the information.



- Draw the line of best fit on the scatter graph.
- Use your line to predict:
 - The percentage attendance of a student who scored 80.
 - The score of someone with 60% attendance.

Complete the pie chart for students' favourite colour.

Colour	Freq
Red	5
Green	8
Yellow	6
Other	11



The pie chart shows information about the favourite milkshake flavour of some students.

15 students like strawberry the best.

- How many students like chocolate the best?
- How many students like banana the best?

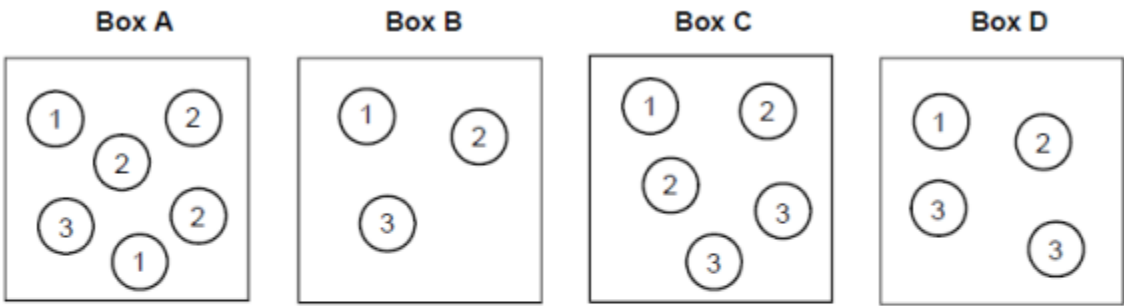
Favourite milkshake flavour



- A fair coin is flipped 600 times. How many times would you expect to get a tail?
- A dice is rolled 120 times. How many times would you expect to get a 3?
- The probability of picking a blue counter from a bag is $\frac{1}{3}$. How many times would you expect to pick a blue counter if you picked 150 counters, putting them back each time?

Handling Data Exam Questions

Boxes A, B, C and D contain balls with numbers on them.



A ball is picked at random from each box.

(a) Which box gives the **greatest** chance of picking a 3?

You **must** show your working.

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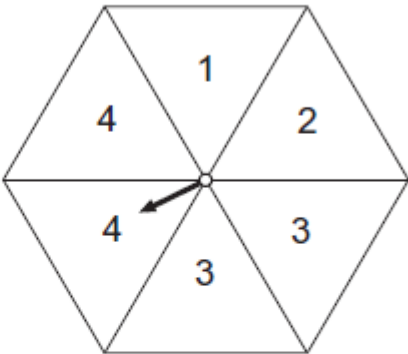
(b) Which two boxes give the **same** chance of picking a 1?

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Box and Box

(a) The arrow on this spinner is equally likely to land on each section.



The arrow is spun 72 times.

How many times do you expect the arrow to land on 4?

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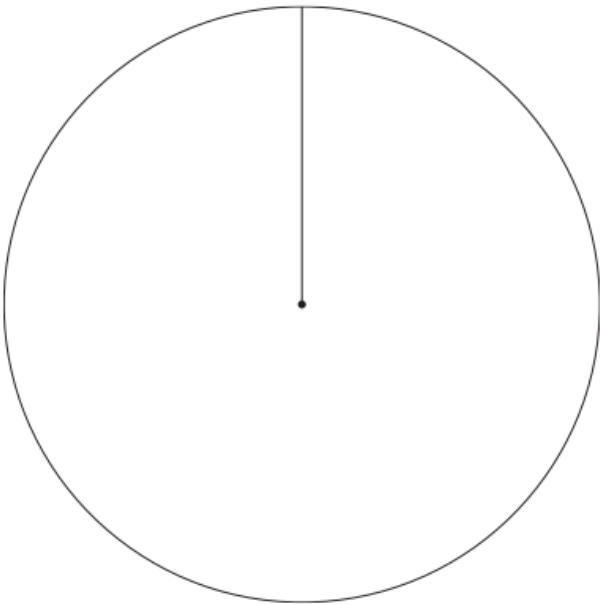
Answer

Ian sells cans of drinks.

(a) The table shows the percentages of drinks sold on Monday m

Drink	Percentage Sold
Cola	30%
Lemonade	20%
Orange	50%

Draw a pie chart for the data.



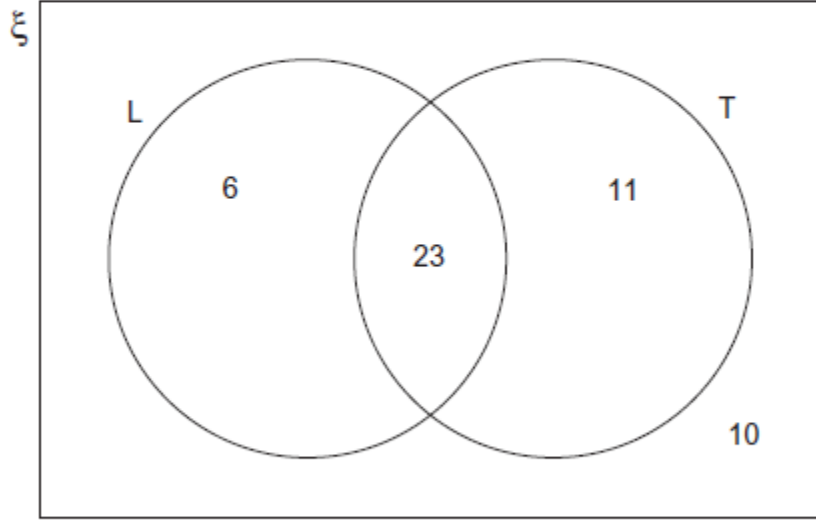
Solid Handling Data Exam Questions

Here is a Venn diagram.

It shows information about the number of students who have a laptop or a TV.

Set L represents students with a laptop.

Set T represents students with a TV.



There are 50 students altogether.

A student is chosen at random.

- (a) Work out the probability that the student has a laptop.

Answer

- (b) Work out the probability that the student has a laptop **and** a TV.

Answer

- (c) Complete the sentence to make it true.

The probability that the student

..... is $\frac{11}{50}$

A bag contains counters that are red, blue, green or yellow.

	red	blue	green	yellow
Number of counters	9	$3x$	$x - 5$	$2x$

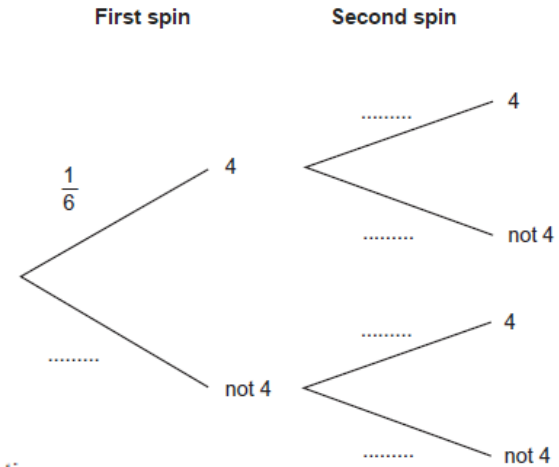
A counter is chosen at random.

The probability it is **red** is $\frac{9}{100}$

Work out the probability it is green.





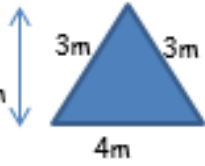
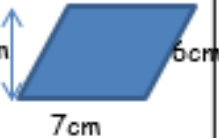
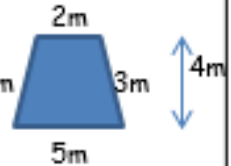
- (a) Complete the tree diagram for the dice landing on 4



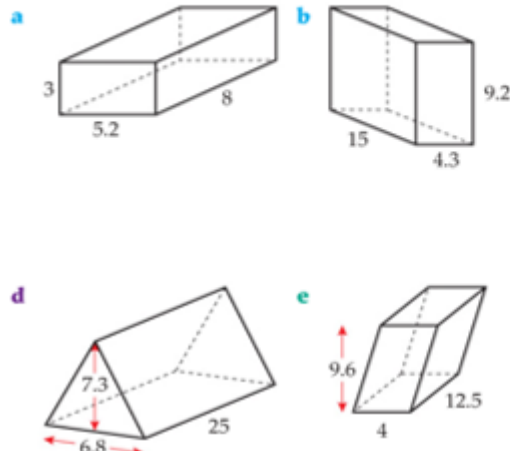
- (b) Work out the probability of the dice landing on 4 both times.


Answer

Shape and Space

Shape	Formula for Area	Area	Perimeter
 <p>3cm 3cm</p>	$A = l^2$	$A = 3 \times 3 = 9\text{cm}^2$	$P = 3 + 3 + 3 + 3 = 12\text{cm}$
 <p>2cm 5cm</p>			
 <p>3m 3m 4m</p>			
 <p>5cm 7cm 6cm</p>			
 <p>2m 3m 3m 5m 4m</p>			

Calculate the volume of the prisms.
All lengths are in centimetres.



2. 

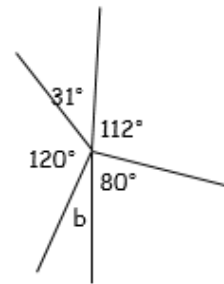
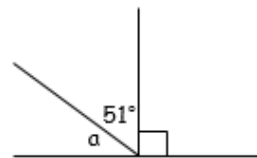
$x + 5$

$3x$

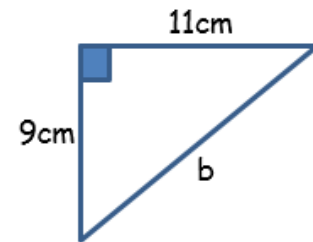
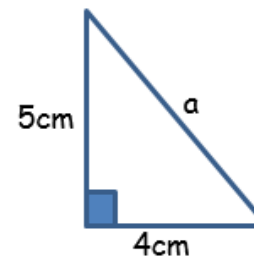
The perimeter of the rectangle is 82cm.

- Write an equation for the perimeter of the rectangle.
- Solve your equation to find the value of x . Hence find the length of each side.

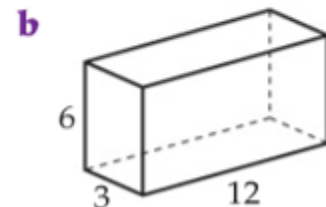
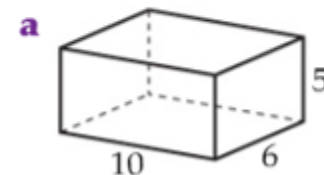
Find the missing angles:



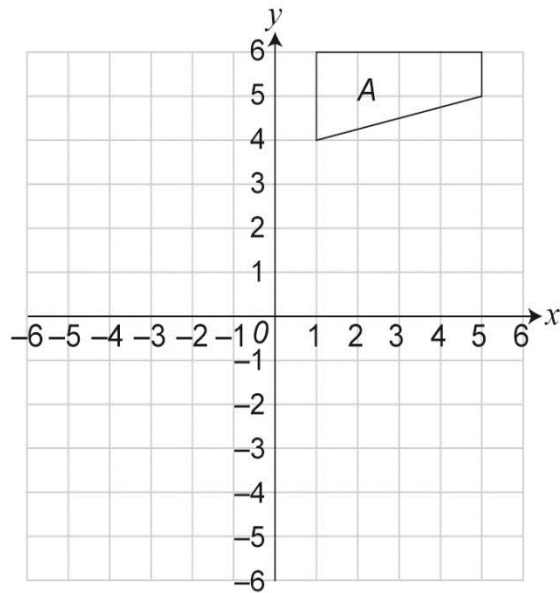
Find the length of the hypotenuse of the triangles:



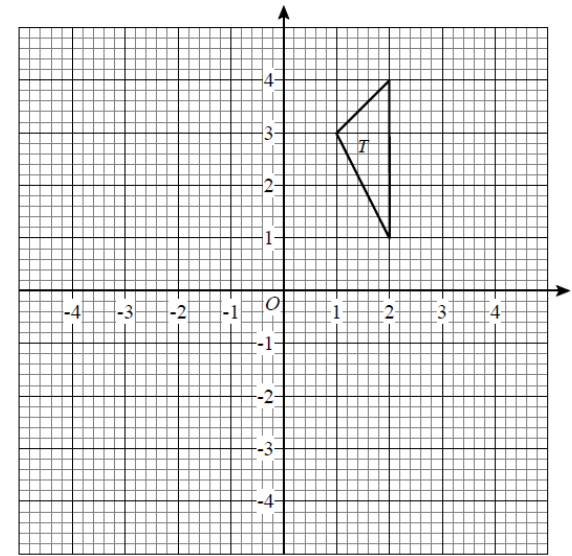
Calculate the surface area of the prisms.
All lengths are in centimetres.



Reflection and Rotation

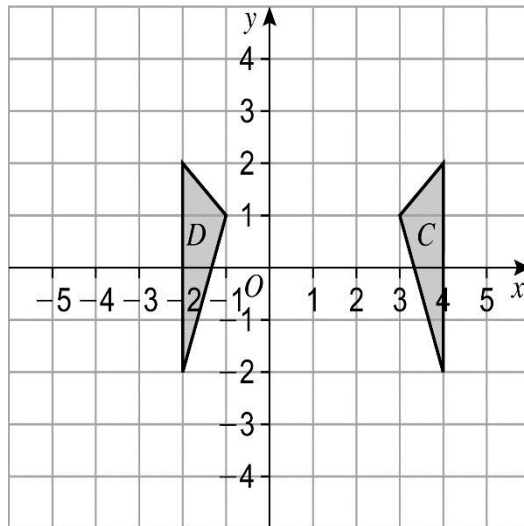


Reflect the shape A in the line $y = 1$. Label the image B.



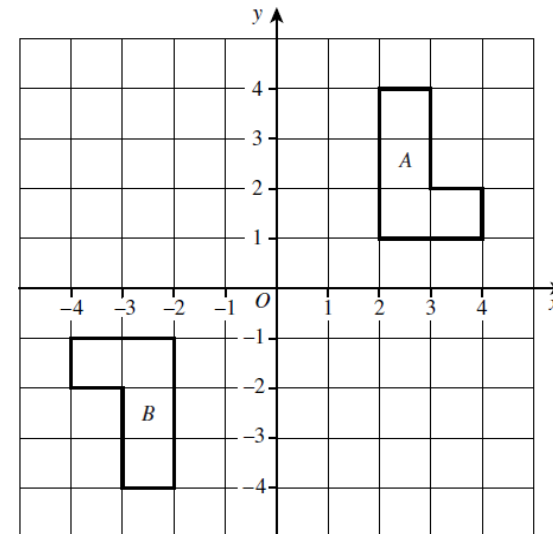
Triangle T is drawn on the grid.

Draw the image of T after a rotation of 90° anticlockwise about O.



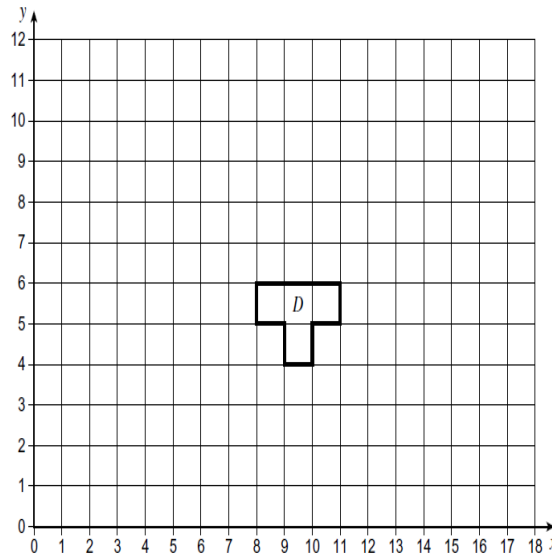
In the diagram, the triangle D is the image of triangle C after a reflection in a mirror line.

- Draw the mirror line on the diagram using a dashed line.
- Write down the equation of the mirror line.

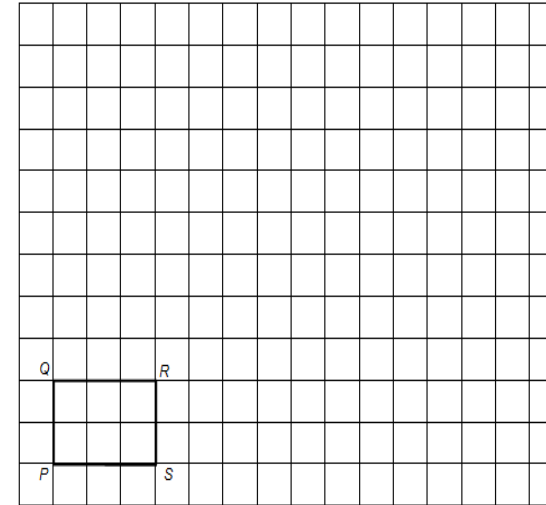


Describe fully the single transformation which takes shape A onto shape B.

Translation and Enlargement

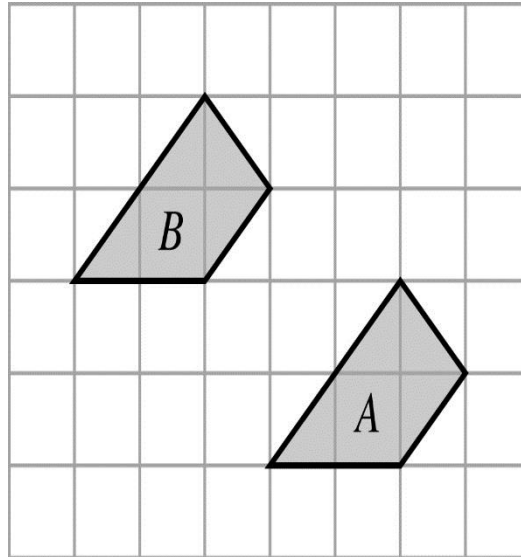


Translate shape D by vector $\begin{pmatrix} 6 \\ 3 \end{pmatrix}$.
Label the new shape E.



Enlarge PQRS by scale factor 3.

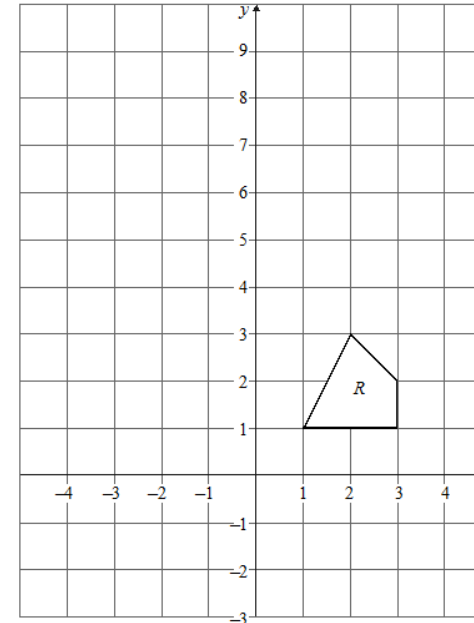
How many times bigger is the area of the enlarged shape than the area of PQRS?



In the diagram, shape A has been translated to shape B.

Describe the transformation that takes shape A to shape B.

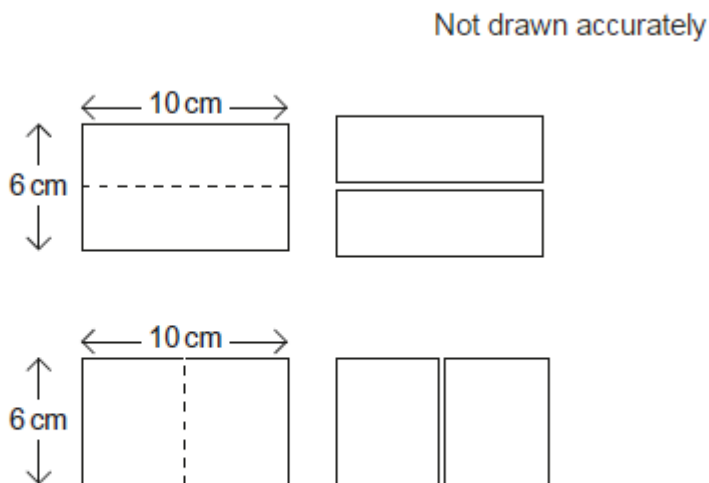
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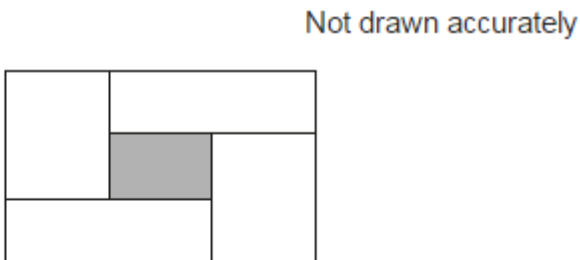
Enlarge shape R by scale factor of 3, centre of enlargement (4,1).

Shape and Space Exam Questions

Two 10 cm by 6 cm rectangles are cut in half as shown.



The four pieces are joined together, without overlap, as shown.

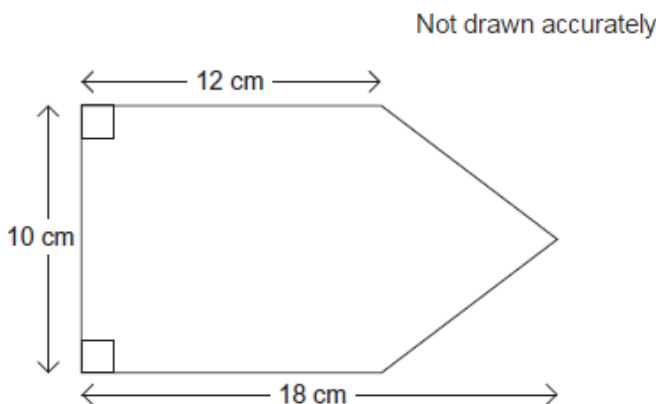


Work out the perimeter of the shaded rectangle.

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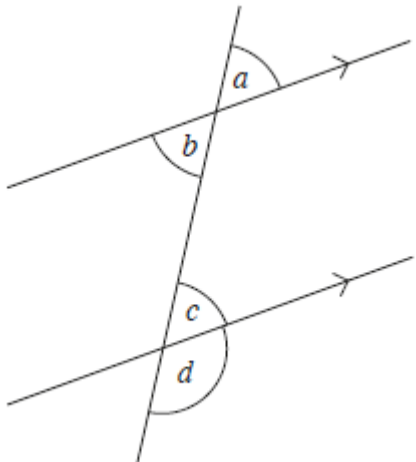
.....

Work out the area of this pentagon.



.....

.....



(a) Which angles are vertically opposite?
Circle your answer

- a* and *b* *a* and *c* *b* and *c* *b* and *d* *c* and *d*

(1)

(b) Which angles are alternate?
Circle your answer

- a* and *b* *a* and *c* *b* and *c* *b* and *d* *c* and *d*

(1)

(c) Which angles are corresponding?
Circle your answer

- a* and *b* *a* and *c* *b* and *c* *b* and *d* *c* and *d*

Solid Shape and Space Exam Questions

The exterior angle of a regular polygon is 45°

Circle the name of the regular polygon.

pentagon hexagon octagon decagon

- (a) Three electric cars are tested by driving them around a track until the battery runs out. The table shows some information about their performance.

Car	Total time travelled (hours)	Average speed (km/h)	Total distance travelled (km)
A	4	35	
B		40	180
C	3		150

Complete the table.

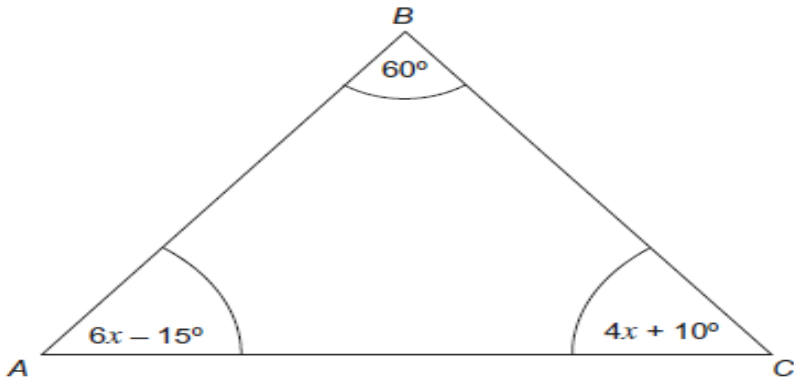
- (b) Two cars are driven around a 10 kilometre track. Both cars leave from the start line at the same time.

Car X travels at exactly 40 km/h
Car Y travels at exactly 30 km/h

How many minutes will it be before they pass the start line together again?

Show that ABC is an equilateral triangle.

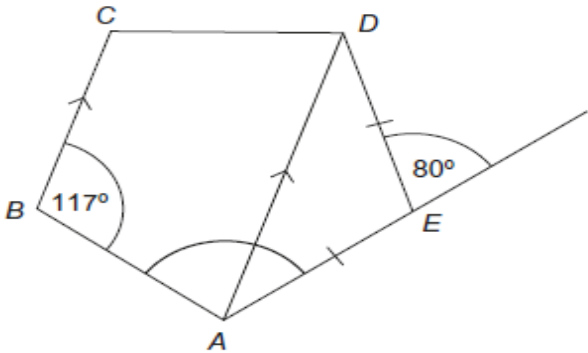
Not drawn accurately



AD is parallel to BC .

$AE = DE$

Not drawn accurately



Work out the size of angle BAE .