Name: _____

HEROES TUITION

November Homework
Maths
Higher

Please return this booklet to your maths teacher by the end of the month.
All answers will be sent to your parents or guardians, so please ensure it is marked before handing it in.
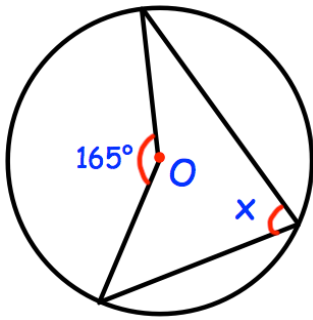
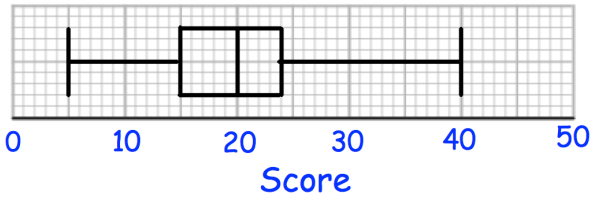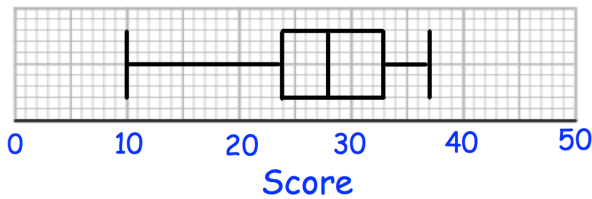# Heroes Tuition Centre - Homework

Name: _____

1st November	Higher

165° O ✗

Find x

7A results


```
0    10    20    30    40    50
            Score
```

7B results


```
0    10    20    30    40    50
            Score
```
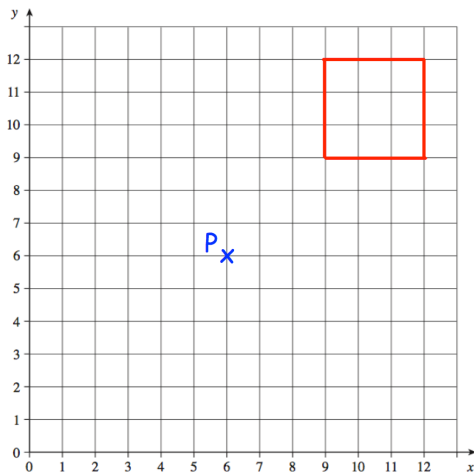
Shown are class 7A's and 7B's test results.

Compare their results

Enlarge by scale factor −$\frac{1}{3}$

P ✗

Factorise
$2x^2 + 5x - 7$

Solve
$2x^2 + 5x - 7 = 0$
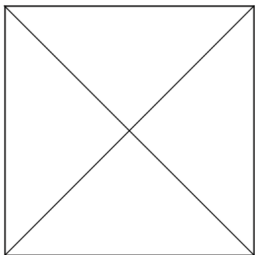
Heroes Tuition Centre - Homework

Name: _____

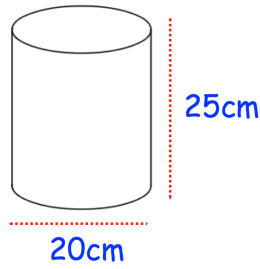| **2nd November**	
x is ⅖ of y y is ⅞ of z Write down the ratio of x : y : z	
Expand and simplify (y − 3)(y + 1)(y + 4)	
Shown is a square 	The length of each diagonal is 4cm. Find the perimeter of the square.
Simplify $\sqrt{220}$	
Simplify $$\frac{2a^4}{3b^3} \times \frac{6b^2}{5a}$$	

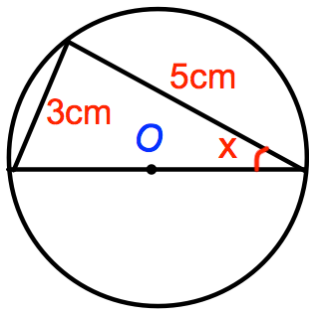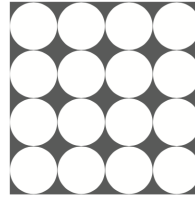# Heroes Tuition Centre - Homework

Name: _____

3rd November

Calculate the volume of the cylinder.

25cm

20cm

16 cylinders are placed in a box of height 30cm as shown.

Calculate the percentage of the box that is not filled by the cylinders.

5cm

3cm

O   x

Find x

Factorise

$2x^2 - 7x - 15$

Mrs Jenkins is making decorations for a wedding.
She needs $18\sqrt{5}$ metres of ribbon in total.
Mrs Jenkins has 40 metres of ribbon.
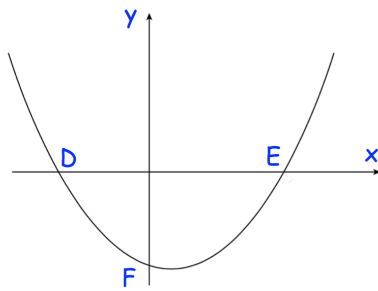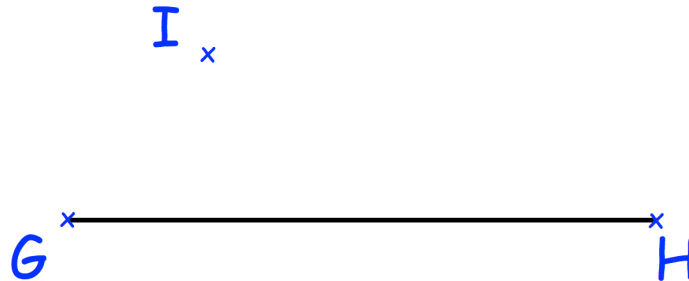Does she have enough ribbon?
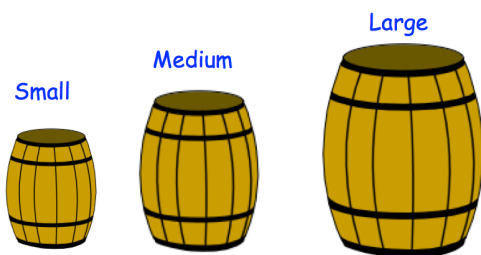
Heroes Tuition Centre - Homework

Name: _____

Using a ruler and compasses, construct the perpendicular from the line GH. to the point I.

I ✗

G ✗ _____ ✗ H

Shown is the graph $y = 3x^2 - 10x - 25$

Find the coordinates D, E and F

(graph showing parabola with points D, E on x-axis and F at minimum)

Complete the table.

	Height	Capacity
Small	24 inches	100 litres
Medium	30 inches	
Large		240 litres

(barrels labelled Small, Medium, Large)
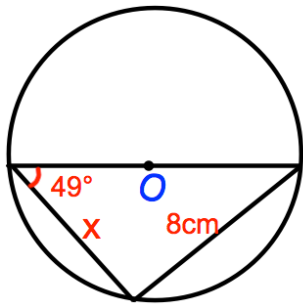

Simplify

$$\frac{9x^2 - 1}{3x^2 - 13x + 4}$$

Heroes Tuition Centre - Homework

Name: _____

5th November

Find x

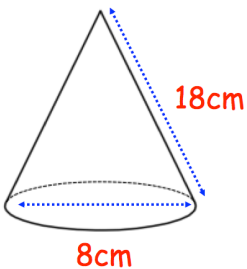
Solve, giving your answers to one decimal place.

$4x^2 + 8x + 3 = 0$

The side length of a square table is 105 cm, correct to the nearest centimetre.

Find the smallest possible perimeter of the table.

Simplify

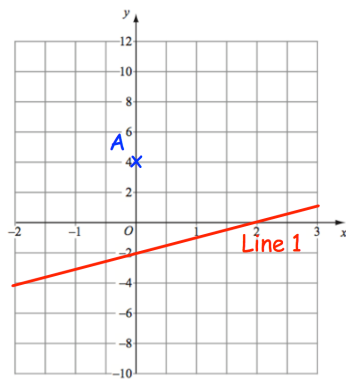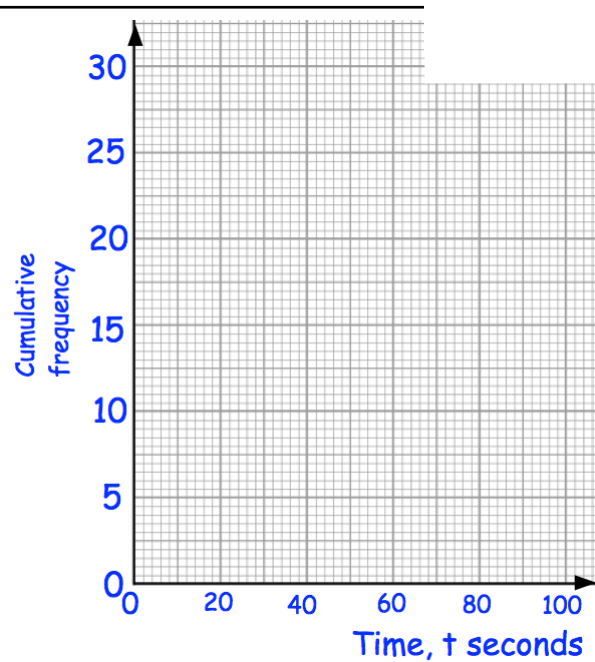$$\frac{ab}{c} \times \frac{c}{ae}$$

Calculate the volume of this cone.

Heroes Tuition Centre - Homework

Name: _____

Time, (t)	Cumulative frequency
0< t ≤ 40	4
0< t ≤ 60	11
0< t ≤ 70	16
0< t ≤ 80	22
0< t ≤ 100	30

Draw a cumulative frequency graph for this information.

Shown is Line 1 and also the point A (0, 4)

Find the equation of Line 1

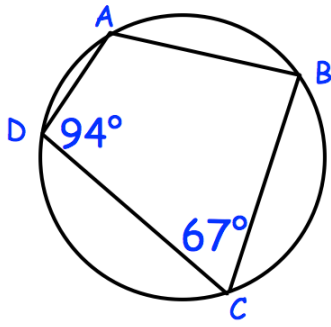Write down the equation of the line parallel to Line 1 and that passes through the point A

Make m the subject of

$y - mp = np + 2y$

Heroes Tuition Centre - Homework
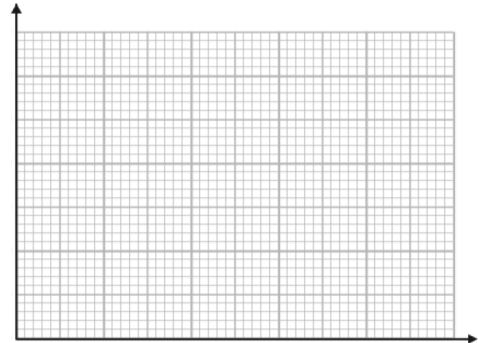
Name: _____

Find angle DAB.

Find angle ABC.

Work out

$$16^{1.5} + 8^0$$

Length, l	Frequency
0 < l ≤ 4	36
4 < l ≤ 6	40
6 < l ≤ 8	48
8 < l ≤ 12	44
12 < l ≤ 20	32

Draw a histogram for this data.

Frequency Density

length

The length of a line is 24 centimetres, correct to the nearest centimetre.

Write down the least possible length of the line.

Write down the greatest possible length of the line.

Heroes Tuition Centre - Homework
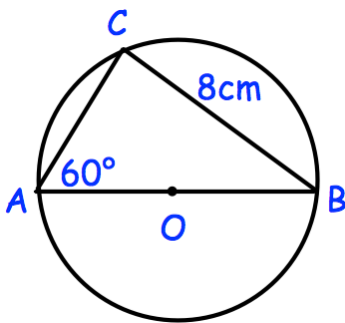
Name: _____

8th November

Shape A is translated by vector $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ to make Shape B.

Shape B is translated by vector $\begin{pmatrix} -5 \\ -2 \end{pmatrix}$ to make Shape C.
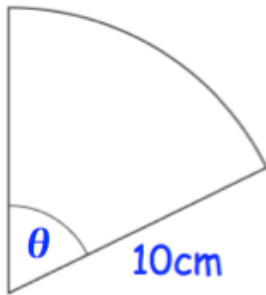
Describe the single transformation that maps Shape C to Shape A

Work out the value of

$$125^{\frac{2}{3}}$$

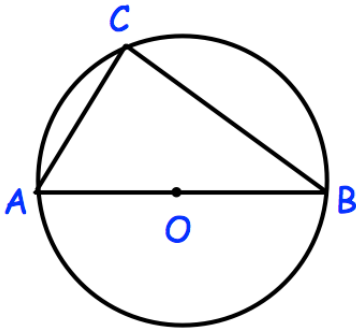---

Find AC.

The area of the sector is 27cm².
Find the size of the missing angle.

Write down the equation of a line perpendicular to $y = 5x + 3$

Heroes Tuition Centre - Homework

Name: _____

BC is 16cm.
AC is 12cm.

Find the area of the circle.

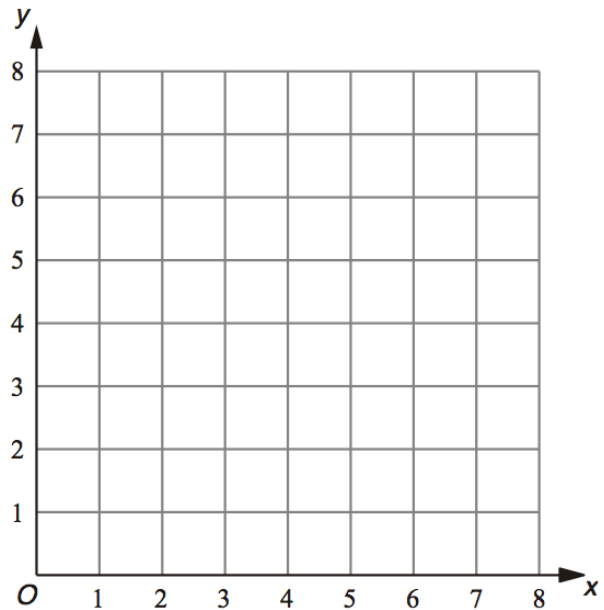
A region R satisfies the inequalities

x + y ≤ 7

x > 2

y ≤ 3

Show this region on the grid.

Sophie rolls an ordinary 6 sided dice three times.

What is the probability she gets exactly one 6?

A helicopter leaves Bristol and flies due east for 10 miles. Then the helicopter flies 8 miles north before landing.

Calculate the bearing of the helicopter from Bristol.

Heroes Tuition Centre - Homework
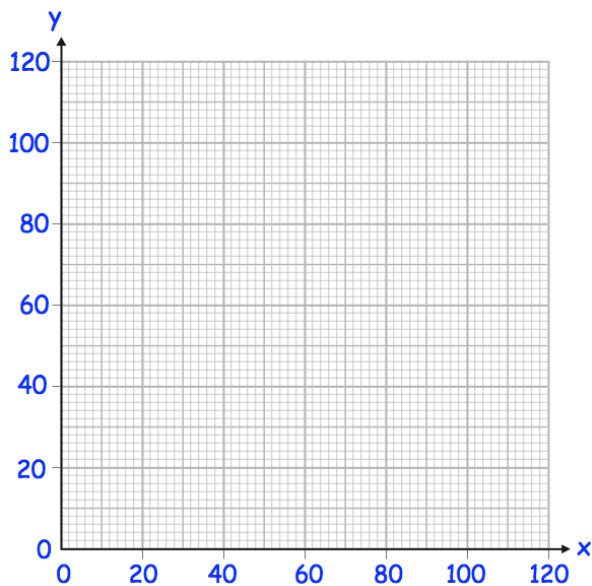
Name: _____

Solve the simultaneous equations

$$7x - 15y = 2.5$$
$$3x - 2y = 5.5$$

Simplify fully

$$\frac{x^2 + 8x}{x^2 + 10x + 16}$$

A greengrocer sells bananas and apples.
In one day he sells
up to 80 bananas
up to 90 apples
no more than a total of 110 pieces of fruit
Let x be the number of bananas sold
Let y be the number of apples sold.

Show the region below that satisfies these inequalities
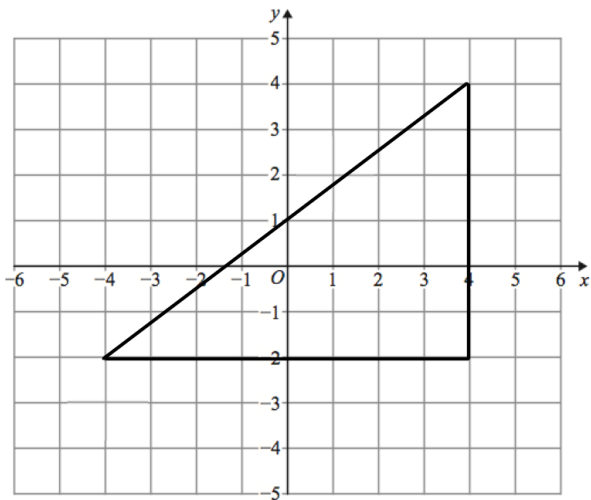
Given that

a : b = 5 : 2   and   b : c = 9 : 11

Find the ratio   a : c

Give your answer in its simplest form.

Heroes Tuition Centre - Homework
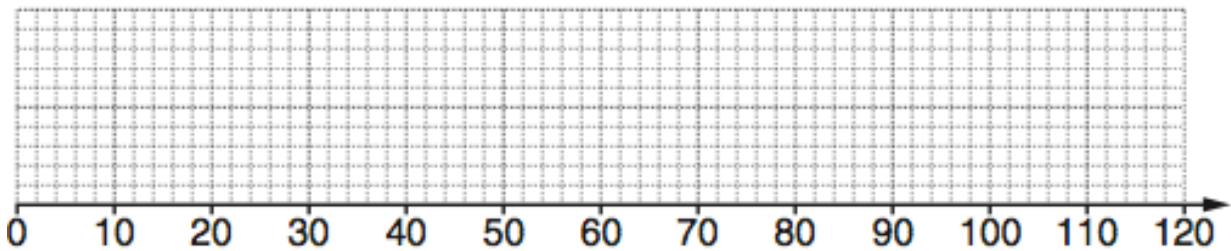
Name: _____

Enlarge the triangle by scale factor $-\frac{1}{2}$, using centre of enlargement (0, 0)

Simplify

$$\frac{x}{y} \times \frac{x}{y}$$

Simplify

$$\frac{4x}{5y} \times \frac{3y}{8x}$$

Lowest: 20
Lower Quartile: 50
Median: 65
Upper Quartile: 72
Highest: 108

Draw the box plot above.

Calculate the range.

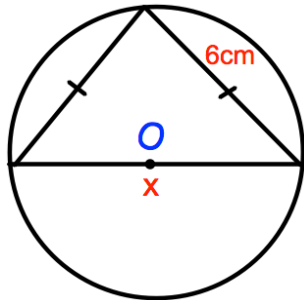Calculate the interquartile range.

Heroes Tuition Centre - Homework

Name: _____

The bearing of A from B is 245°

Find the bearing of B from A.

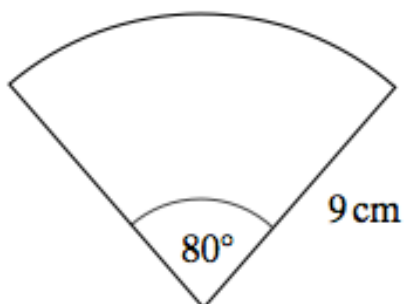

6cm

O

x

Find x

The sum of the interior angles in a polygon is 7380^0.

Calculate the number of sides the polygon has.

Solve the simultaneous equations

$4x - y = 17$

$y = x - 2$

---

9 cm

80°

Find the area of the sector.

Heroes Tuition Centre - Homework

Name: _____

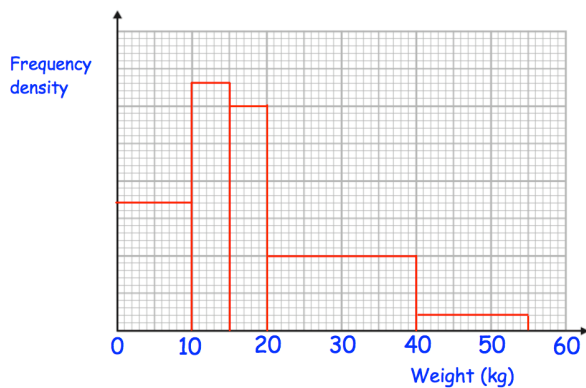## 13th November

Evaluate

$81^{0.5}$

Which of these points is not 10 units from the point (0, 1)?

(10, 1)   (6, 9)   (1, 11)

(0, –9)   (–8, 7)   (–10, 1)

Frequency density

Weight (kg)

Use the information in the histogram to complete the frequency table.

weight (w kg)	Frequency
0 < w ≤ 10	34
10 < w ≤ 15	33
15 < w ≤ 20	
20 < w ≤ 40	
40 < w ≤ 55	6

A restaurant menu has 6 starters, 9 mains and 7 desserts.

A customer can choose:

- a starter and a main
- a main and a dessert
- a starter, a main and a dessert

How many different ways of choosing a meal are there?
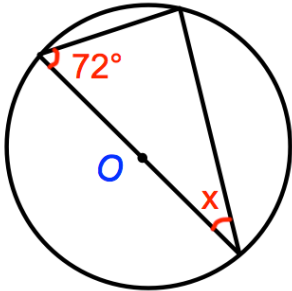
Heroes Tuition Centre - Homework

Name: _____

A recipe for a drink says

"mix 2 parts orange juice with 7 parts lemonade."

Victoria has 100ml of orange juice and 300ml of lemonade.

What is the maximum amount of the drink that she can make?

Find x

Find the coordinates where the line $y = 8x - 15$ and the curve $y = x^2$ meet.

Write 1008 as a product of prime factors.

Express your answer in index form.

Hence find the **least** number by which 1008 would need to be multiplied by to give a square number.
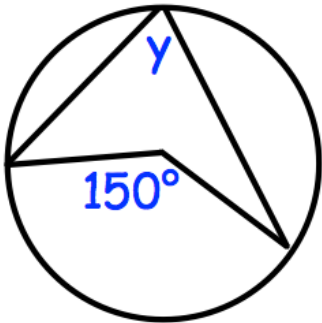
Heroes Tuition Centre - Homework

Name: _____

On an airplane, the ratio of men to women is 7:5. The ratio of women to children is 4:3.

Jack says more than half the passengers are men. Is he correct?

Find y

Simplify fully

$$\frac{x^2 - 4x - 12}{x^2 - x - 30}$$

Simplify

$$\sqrt{3} \times \sqrt{3} \times \sqrt{2} \times \sqrt{2}$$

A shop sells two different sizes of rugby ball.

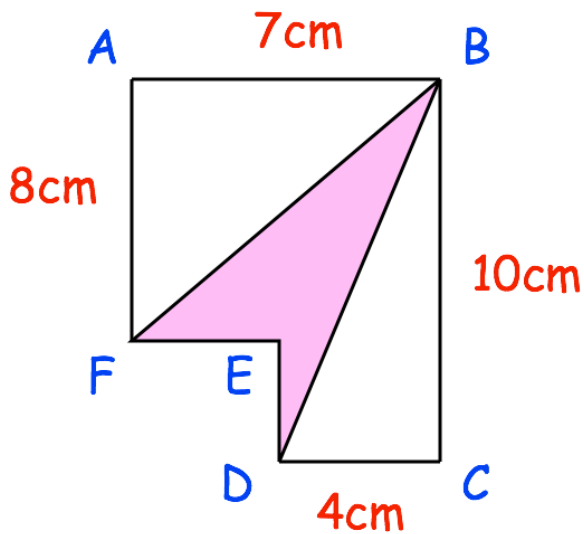
A small rugby ball has a length of 8cm and surface area of 90 cm²
A large rugby ball has a length of 16cm. Calculate the surface area of a large rugby ball.

Heroes Tuition Centre - Homework

Name: _____

Simplify $\sqrt{60}$

Find the area of shape BDEF

Find the perimeter of shape BDEF

James, Fred and Kevin each take a penalty

The probability James scores is ⅘
The probability Fred scores is ⅔
The probability Kevin scores is ¾
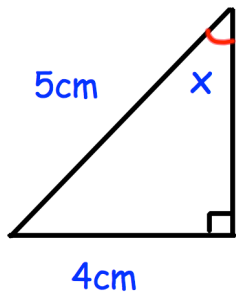
What is the probability that all three score?

Solve

$$4x^2 + 4x - 3 = 0$$

Heroes Tuition Centre - Homework
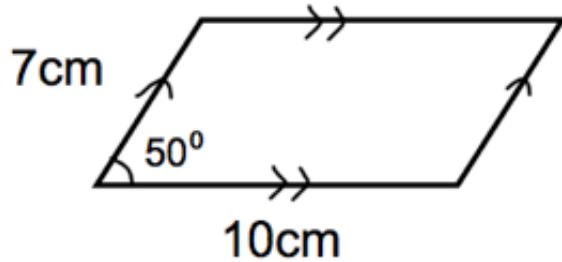
Name: _____

5cm

x

4cm

Write down the value of sin x
Give your answer as fraction.

Simplify

$$\frac{3}{w} \times \frac{x}{4} \times \frac{y}{w}$$

Find the area of the parallelogram.

7cm

50⁰

10cm

Circle the values which are irrational

4^0

$\sqrt{64}$

$\sqrt{3}$

$100^{0.5}$

π

Solve $5^x = 40$.

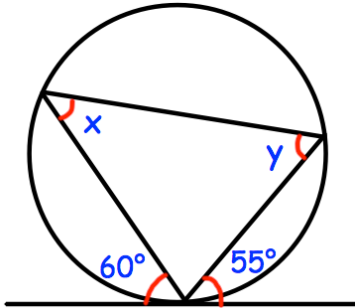Give your answer to 1 decimal place.

Heroes Tuition Centre - Homework

Name: _____

Shape A is translated by vector $\begin{pmatrix} -4 \\ 9 \end{pmatrix}$ to make Shape B.

Shape B is translated by vector $\begin{pmatrix} 8 \\ 0 \end{pmatrix}$ to make Shape C.

Describe the single transformation that maps Shape A to Shape C

Find x and y

Simplify fully

$$\frac{4x^2 - 25}{6x^2 - 11x - 10}$$

Write 1.2525252525... as a fraction.

Martin invests £500 into a savings account that pays X% interest per annum. After 5 years, he has £750 in the account.

Find X

Heroes Tuition Centre - Homework

Name: _____

Work out 9^0

Work out $9^{1/2}$

A coin is flipped three times.

What is the probability of getting three tails?

Simplify

$$\frac{ab}{3} \div \frac{2a}{b}$$
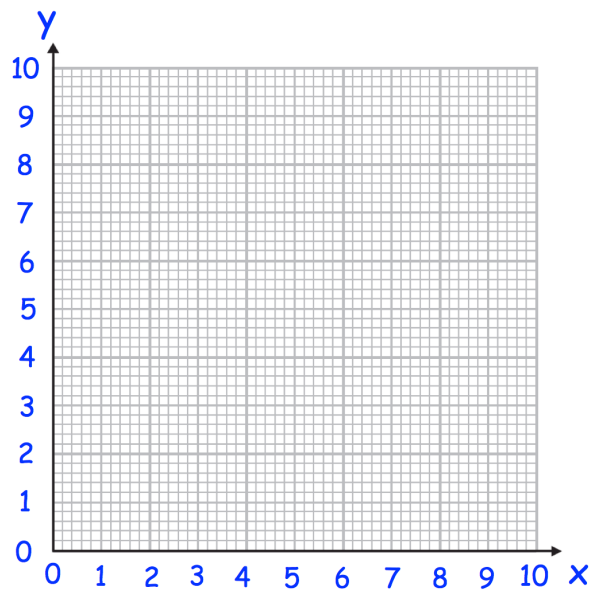
Complete the table of value for
$y = \dfrac{4}{x}$

x	0.5	1	2	4	8	10
y						

On the grid, draw the graph of
$y = \dfrac{4}{x}$

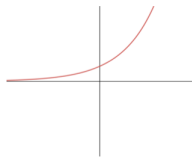for $0.25 \le x \le 10$

Heroes Tuition Centre - Homework

Name: _____
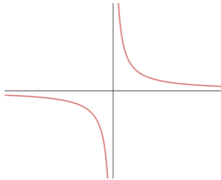
Graph A
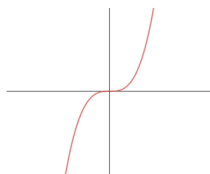
Graph B

Graph C

Graph D

Match each graph to the correct equation

$y = x^2$ is graph **A**

$y = x^3$ is graph ....

$y = 2^x$ is graph ....

$y = \dfrac{1}{x}$ is graph ....

Estimate $38^{\frac{3}{2}}$

Simplify fully

$$\dfrac{x^2 + 8x}{x^2 + 10x + 16}$$

Solve, giving your answers to one decimal place.

$x^2 + 2x - 4 = 0$
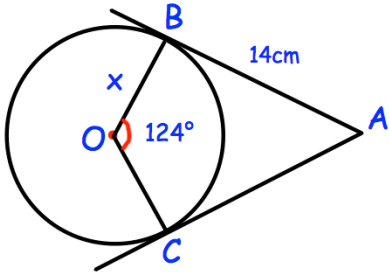
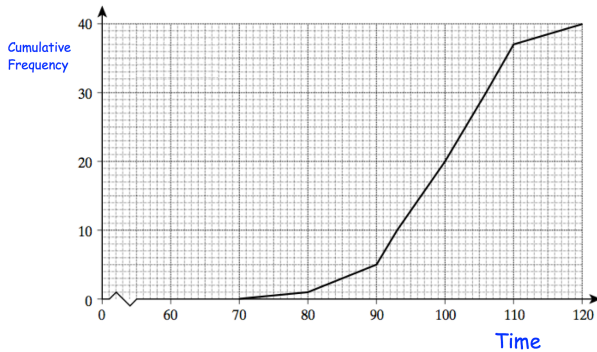# Heroes Tuition Centre - Homework

Name: _____

The population of a country is 4.8×10^6.

The population of a city is 8×10^5

| What percentage of the population of the country live in that city?

Find x

Estimate the median

Using the cumulative frequency curve, how many people took over 95 seconds?

Write down the Sine Rule

Write down the Cosine Rule
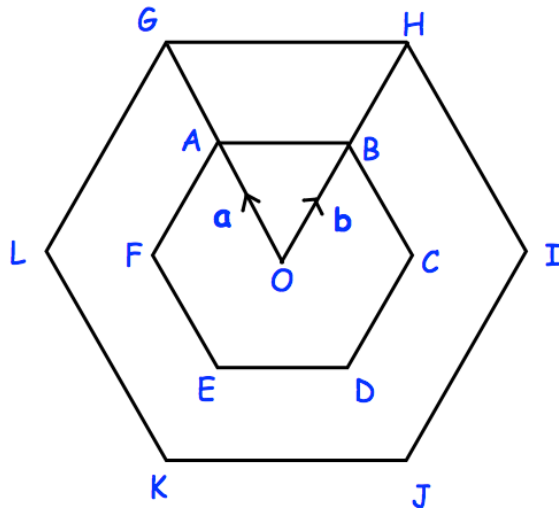
Heroes Tuition Centre - Homework

Name: _____

y is directly proportional to the square of x.
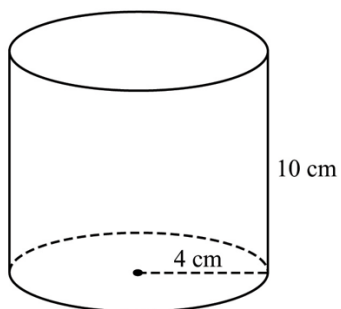When y = 32, x = 4.

Find the value of y when x = 8.

ABCDEF and GHIJKL are regular hexagons with centre O.
GHIJKL is an enlargement of ABCDEF, with scale factor 2.

Write down a vector for $\overrightarrow{AB}$

Write down a vector for $\overrightarrow{FC}$

Factorise 9y² - 144

Calculate the surface area of the cylinder.

10 cm

4 cm

Heroes Tuition Centre - Homework

Name: _____
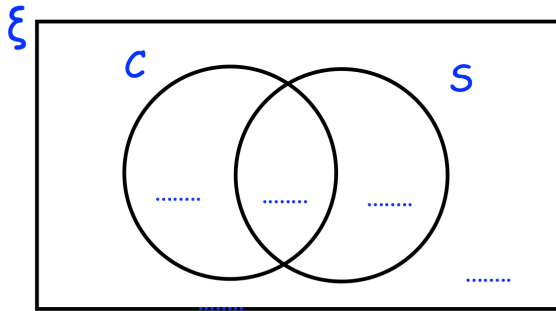
ξ = 80 students
C = students that have visited Canada
S = students that have visited Sweden

50 students have visited only Canada or only Sweden

$\dfrac{3}{10}$ of these 50 students have only visited Sweden

The number of students who have visited Canada is double the number of students that have visited Sweden
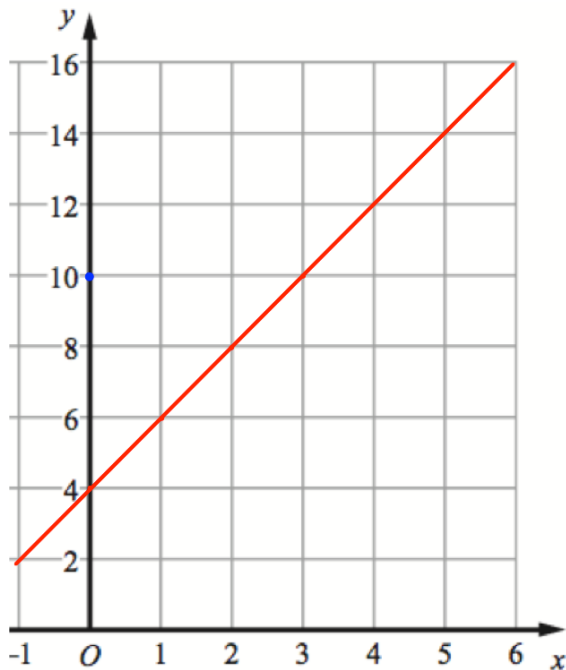
Complete the Venn Diagram

ξ

C   S

The probability of a team winning a match is 0.8.

The team plays three matches.

What is the probability the team wins all three matches?

Write down the equation of the line shown.

A line is perpendicular to the line shown and passes through (0, 10).

Find its equation.
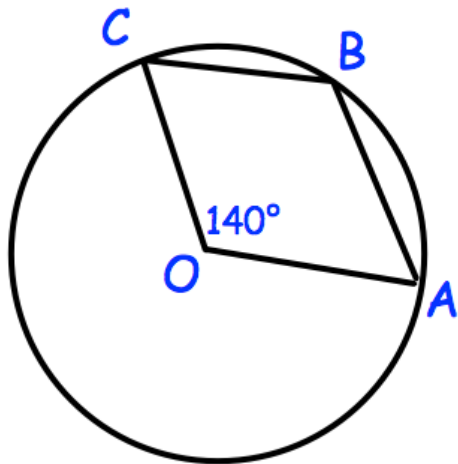
Heroes Tuition Centre - Homework

Name: _____

A group of workers are painting the classrooms in a school. 10 workers could paint all the classrooms in 12 days.
For the first five days, only two workers paint the classrooms.
For the next six days, only five workers paint the classrooms.
For the rest of the days, all 10 workers paint the classrooms.

Work out the total number of days taken to paint the classrooms.

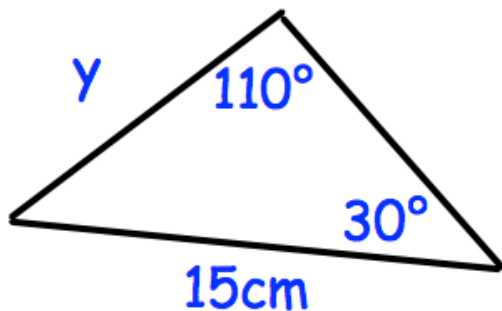Find the value of

$$64^{\frac{2}{3}}$$

O is the centre of the circle.
Angle AOC is 140°.
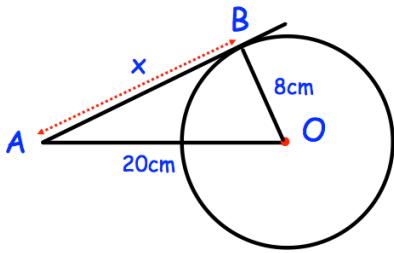
Find angle ABC.

BC = BA.

Find angle OAB.

Find y.

Heroes Tuition Centre - Homework

Name: _____

AB is a tangent
Find x

Evaluate

$$\left(\frac{16}{25}\right)^{\frac{1}{2}}$$

Simplify

$$\frac{x^2 + 11x}{x^2 - 121}$$

---

length, L, cm	Frequency
$0 < L \le 10$	21
$10 < L \le 20$	11
$20 < L \le 30$	31
$30 < L \le 40$	12
$40 < L \le 50$	25

Lenny is drawing a histogram.

Calculate each frequency density.

D is inversely proportional to P.

Sketch this graph.

Heroes Tuition Centre - Homework

Name: _____

Evaluate

$$9^{\frac{3}{2}}$$

Write down the formula to work out frequency density

Write down the equation of the line that is perpendicular to x + 2y = 4 and passes through the point (0, 5)

Factorise

$3y^2 + 16y + 16$

Duncan bought a toy that grows when placed in water.
Before placing the toy in water it was 4cm tall.
After placing the toy in water it grew to a similarly shaped toy that was 10cm tall.
Is the claim reasonable?

Grows 10 times larger

Heroes Tuition Centre - Homework

Name: _____

27th November

58.9×10^3 *fifty thousand*

6000 5.98×10^4

Which of these has the greatest value?

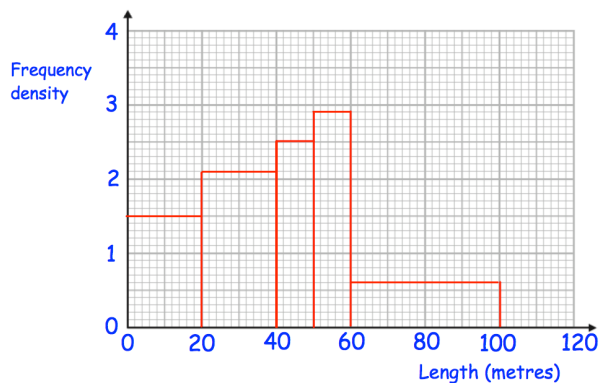A swimming pool is 12m in width and 25m in length.

The width is to the nearest metre.
The length is to the nearest metre.

Find the minumum area.

Shape A is translated by vector $\begin{pmatrix} -3 \\ 1 \end{pmatrix}$ to make Shape B.

Shape B is translated by vector $\begin{pmatrix} -5 \\ -2 \end{pmatrix}$ to make Shape C.

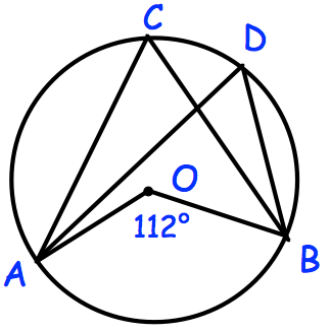Describe the single transformation that maps Shape C to Shape A

Complete this frequency table.

Length, l metres	Frequency
0 < l ≤ 20	30
20 < l ≤ 40	
40 < l ≤ 50	25
50 < l ≤ 60	
60 < l ≤ 100	24

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Find the size of angle ADB.

A rectangular field has:

length 120m, to the nearest 10m.
width 86m, to the nearest metre.

Calculate the upper bound for the perimeter of the field.

Roger has a biased 6 sided dice.

The probability of a 6 is 0.8 and the other five numbers have an equal probability.

Roger rolls the dice three times.

What is the probability that Roger rolls three sixes?

A ball is dropped from h metres.
After each bounce the ball reaches 80% of its previous height.
After its third bounce it reaches a height of 3.072m.
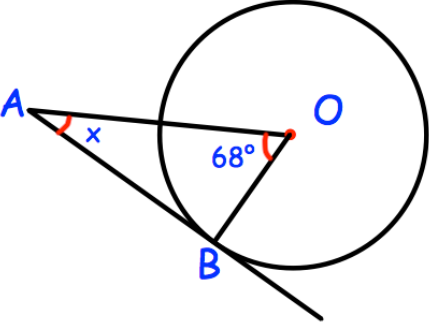
Find h

Given that

$a : b = 9 : 4$ and $b : c = 7 : 3$

Find the ratio $a : c$

Give your answer in its simplest form.

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AB is a tangent

Find x

---

n is an integer. From the expressions

$4n$ $6n-1$ $2n^2$ n^2+1

Which expression(s) will always give an even number?

Which expression(s) will always give an odd number?

Which expression(s) could give an even or odd number?

Simplify

$$\frac{4^5 \times 4^6}{4^3}$$

C is directly proportional to W^3

When C = 9000, W = 10.

Find C when W = 5.

Simplify

$$\frac{2x^2 + 3x - 2}{2x^2 - 15x + 7}$$

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Name: _____
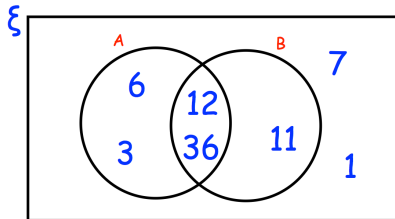
A box contains apples and oranges in the ratio 2:5.
8 apples and 5 oranges are added to the box and the ratio of apples to oranges is now 4:7

How many pieces of fruit were in the box to begin with?
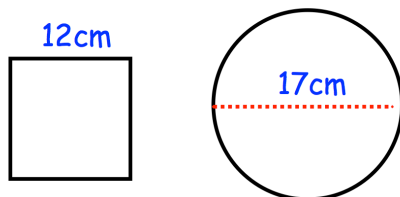

Solve

$$\frac{10 + 8x}{3x} = -4$$

ξ

Write down the numbers that are in set

A ∩ B

Michael bought a hat and a coat.
The hat cost £10.
He sold both items for a total of £90.

Michael made
200% profit on the hat
80% profit on the total cost.

Work out his percentage profit on the cost of the coat.

12cm

17cm

Can the square fit inside the circle without touching the circle?