SILS 4

Mathematics Homework Booklet

Year: 11

Scheme: Higher+

Term: 1

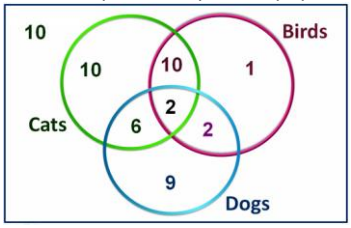
Name:

Homework Sheet 1

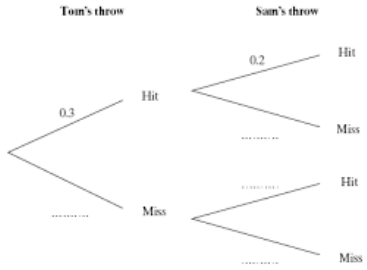
1: Complete the sample space

	Party A	Party B	Don't know	Total
Men	20			80
Women		40	20	
Total			50	200

2: The Venn diagram shows the pets owned by 50 pupils. Write down the probability that a pupil chosen at random owns a dog.



C3: Calculate the probability that both throws are hits.



4: A bag has 4 green and 5 yellow counters. Romeo takes a counter, notes its colour and replaces it. He then takes a second counter. Find the probability that both counters are green.

C5: y is proportional to x. When $y = 7$, $x = 2$. Find y when $x = 5$.

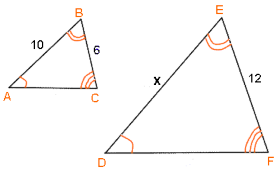
C6: y is inversely proportional to x. When $y = 7$, $x = 2$. Find y when $x = 5$.

C7: Use trial and improvement to solve the equation $x^3 - x = 10$. Start with $x = 2$. Give your answer to 1 dp.

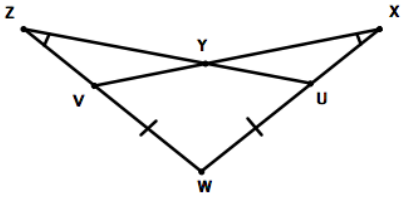
C8: The equation $0 = x^3 - 2x^2 - 5x + 7$ has 3 solutions. The iterative formula $u_{n+1} = \frac{{u_n}^3 - 2{u_n}^2 + 7}{5}$ can find one of the solutions. Use $u_1 = 1$ and solve the equation to 2 dp.

9: Describe the locus of points that are equidistant from a single point.

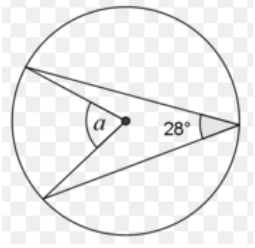
C11: Find the length x



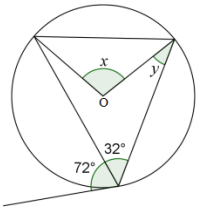
12: Prove that triangles VWX and UWZ are congruent.



C13: Find the size of angle a



C14: Find the value of x



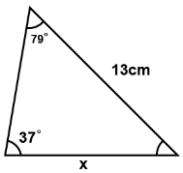
C15: 2.5 cm = 1 inch. A conversion graph is drawn to convert cm to inches. If inches are on the horizontal axis, find the gradient of the graph.

C16: A rectangle has an area of 60 cm^2. A graph is drawn of all possible lengths and widths. Fill in the missing coordinate value.

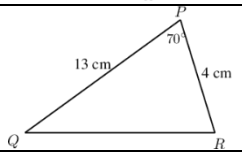
(3, ...)

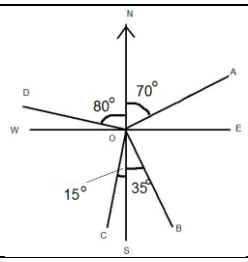
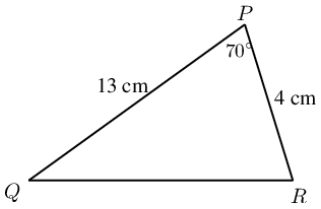
C17: A car starts with 60 litres of fuel and drives for 2 hours 30 minutes. At the end of the time the car has 57 litres of fuel. Find the average rate of fuel loss. State the units of your answer.

C18: Find the value of x



C19: Find the value of side QR.



C10: Write down the bearing of A from O. 	C20: Find the area of the triangle. 
Mark:	Effort:

Exam Question Homework: Possibility spaces

A golf club has 580 members.

Here is some information about their age and gender.

75 of the members are men aged 25 to 39

250 members are aged 60 or over.

15% of the members are women aged 40 to 59

In the under 25 age group the ratio of men to women is 2 : 1

Some other information is shown in the two-way table.

	Under 25	25 to 39	40 to 59	60 or over	Total
Men					
Women		35			230
Total	33				580

Complete the table.

[5 marks]

200 adults were asked to choose whether they preferred to travel on holiday by road, rail or air.

- 30% of the adults chose road.
- Three times as many women as men chose road.
- 112 of the adults were women.
- One quarter of the women chose rail.
- 37 of the men chose air.

Work out the total number of adults who chose rail.

[6 marks]

Ronan is designing a game.

He has two sets of discs laid face down on a table.

The first set of five discs are labelled 1, 3, 5, 7, 9.

The second set of four discs are labelled 2, 4, 6, 8.

Players turn over one disc, at random, from each set and add the numbers together.

(a) Complete the table to show **all** the possible totals.

	1	3	5	7	9
2	3	5	7		
4	5				
6					
8					

(2)

(b) What is the probability of getting a total less than six?

.....

Answer .....

(1)

(c) Ronan uses the game to raise money for charity.

Each player pays 20 p to play the game.

If a player gets a total of exactly 13 they win a bar of chocolate.

It costs Ronan 50 p for each bar of chocolate.

If 100 people play the game, show that Ronan should expect to raise £12.50 for charity.

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(4)

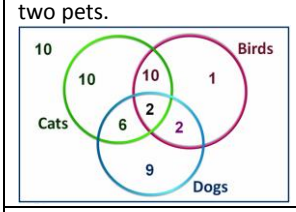
(Total 7 marks)

Homework Sheet 2

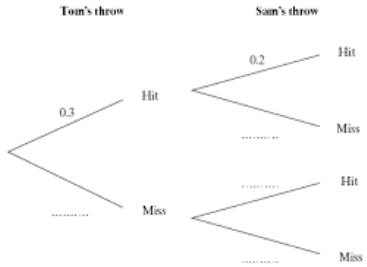
1: Write down the probability that a person chosen at random is a man.

	Party A	Party B	Don't know	Total
Men	20			80
Women		40	20	
Total			50	200

2: The Venn diagram shows the pets owned by 50 pupils. Write down the probability that a pupil chosen at random owns exactly two pets.



C3: Calculate the probability that neither of the throws are hits.



4: A bag has 4 green and 5 yellow counters. Romeo takes a counter, notes its colour and replaces it. He then takes a second counter. Find the probability that both counters are yellow.

C5: y is proportional to x^2. When $y = 7$, $x = 2$. Find y when $x = 5$.

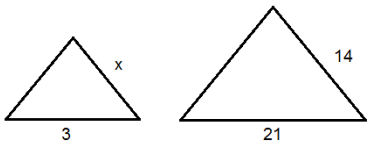
C6: y is inversely proportional to x^2. When $y = 7$, $x = 2$. Find y when $x = 5$.

C7: Use trial and improvement to solve the equation $x^3 - x = 10$. Start with $x = 2$. Give your answer to 2 dp.

C8: The equation $0 = x^3 - 2x^2 - 5x + 7$ has 3 solutions. The iterative formula $u_{n+1} = \sqrt[3]{2u_n^2 + 5u_n - 7}$ can find two of the solutions. Use $u_1 = 3$ and solve the equation to 2 dp.

9: Describe the locus of points that are equidistant from a single line of infinite length.

C11: Find the length x



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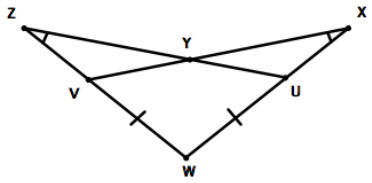
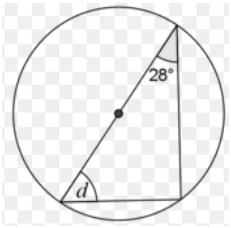
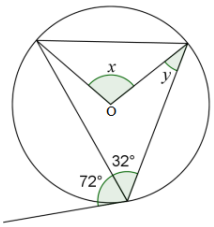


C13: Find the value of angle d



C14: Find the value of y



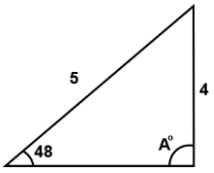
C15: 2.5 cm = 1 inch. A conversion graph is drawn to convert cm to inches. If inches are on the vertical axis, find the gradient of the graph.

C16: A rectangle has an area of 60 cm^2. A graph is drawn of all possible lengths and widths. Fill in the missing coordinate value.

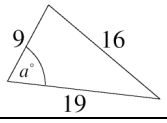
(....., 12)

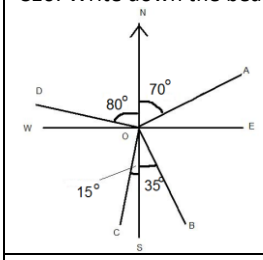
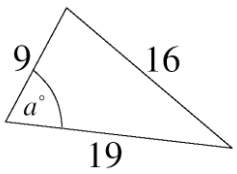
C17: A car starts with 60 litres of fuel and drives for 5 hours. At the end of the time the car has 56 litres of fuel. Find the average rate of fuel loss. State the units of your answer.

C18: Find the value of A.



C19: Find the value of a



C10: Write down the bearing of B from O.	C20: Find the area of the triangle
	
Mark:	Effort:

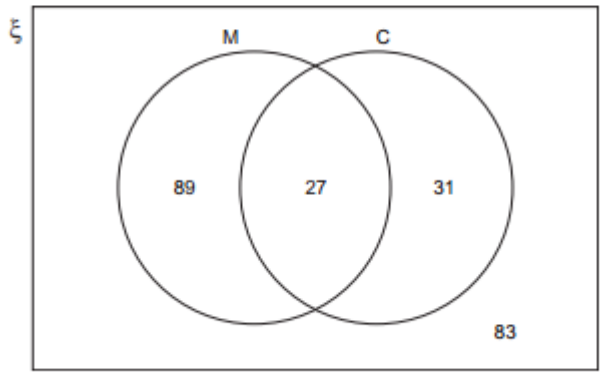
Exam Question Homework: Venn Diagrams

The Venn diagram shows information about passengers on a flight.

ξ = the 230 passengers on the flight

M = male passengers

C = child passengers



One of the passengers is chosen at random.

(a) Work out the probability that the passenger is male.

[1 mark]

.....

Answer .....

(b) Write down the probability that the passenger is a female child.

[1 mark]

Answer .....

(c) The passenger chosen is a child.

Work out the probability that the child is female.

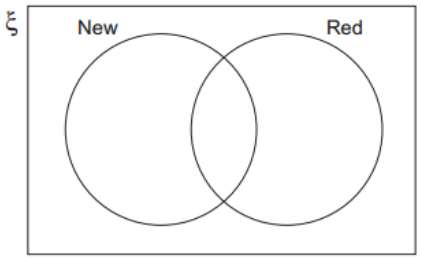
[1 mark]

Answer .....

A car dealer has 9 **new** cars and 12 **red** cars in her showroom.
There are no other cars.
She sells both new and used cars.
The ratio new red cars : used red cars is 1 : 2

How many cars are in the showroom?
You may use the Venn diagram to help you.

[2 marks]



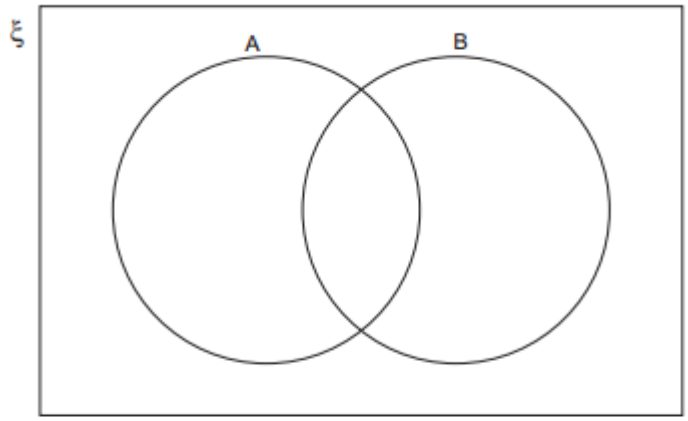
$\xi = \{ 20, 40, 60, 80, 100, 120, 140, 160, 180, 200 \}$

Set A = multiples of 3
Set B = multiples of 8

(a) Put these ten numbers into the diagram.

20 40 60 80 100 120 140 160 180 200

[2 marks]



(b) One of the ten numbers is chosen at random.

Show that

the probability of **not** choosing a multiple of 3

is the same as

the probability of choosing a multiple of 3 or 8 or both.

[1 mark]

.....

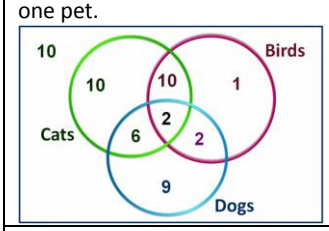
.....

Homework Sheet 3

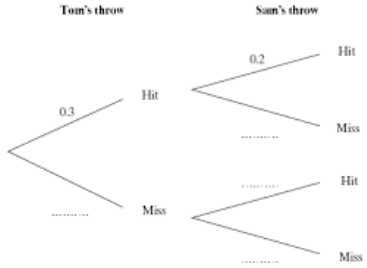
1: Write down the probability that a person chosen at random is someone who doesn't know which party they are in.

	Party A	Party B	Don't know	Total
Men	20			80
Women		40	20	
Total			50	200

2: The Venn diagram shows the pets owned by 50 pupils. Write down the probability that a pupil chosen at random owns exactly one pet.



C3: Calculate the probability that exactly one throw is a hit.



4: A bag has 4 green and 5 yellow counters. Romeo takes a counter, notes its colour and replaces it. He then takes a second counter. Find the probability that both counters are the same colour.

C5: y is proportional to √x. When $y = 7$, $x = 2$. Find y when $x = 5$.

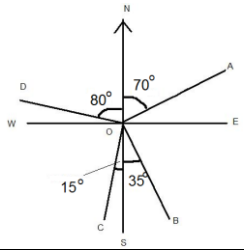
C6: y is inversely proportional to √x. When $y = 7$, $x = 2$. Find y when $x = 5$.

C7: Use trial and improvement to solve the equation $x^3 + 2x = 10$. Start with $x = 2$. Give your answer to 1 dp.

C8: The equation $0 = x^3 - 2x^2 - 5x + 7$ has 3 solutions. The iterative formula $u_{n+1} = \sqrt[3]{2u_n{}^2 + 5u_n - 7}$ can find two of the solutions. Use $u_1 = -2$ and solve the equation to 2 dp.

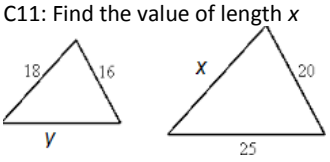
9: Describe the locus of all the points that are equidistant from a single line of finite length.

C10: Write down the bearing of C from O.



Mark:

C11: Find the value of length x



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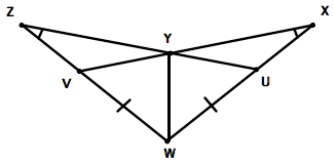

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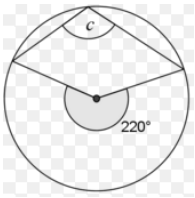
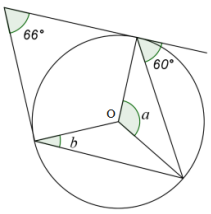


C14: Find the value of a



C15: 5 miles = 8 km. A conversion graph is to be drawn to convert miles to km. If miles are on the horizontal axis, work out the gradient of the graph.

C16: A rectangle has an area of 60 cm². A graph is drawn of all possible lengths and widths. Fill in the missing coordinate value.

(8, ...)

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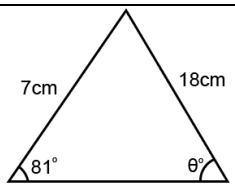

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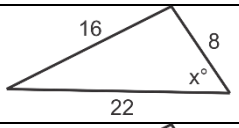
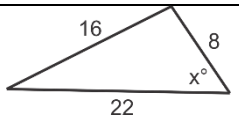


C20: Find the area of the triangle.



Effort:

Exam Question Homework: Tree Diagrams

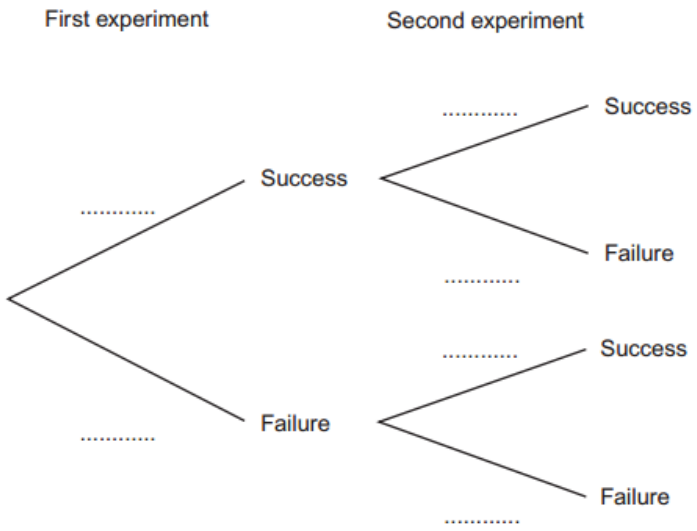
In two **independent** experiments

the probability of success in the first experiment is 0.8

the probability of success in the second experiment is 0.1

Complete the tree diagram.

[3 marks]



50 people took a test.

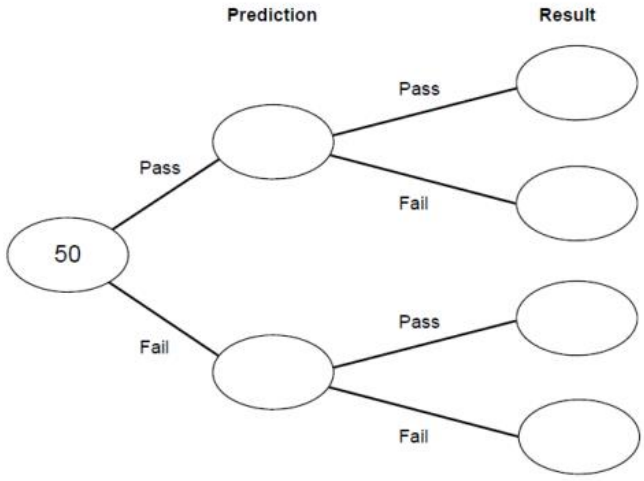
Before the test, they predicted whether they would pass or fail.

30 people predicted they would pass.

26 of the people who predicted they would pass did pass.

37 people passed altogether.

Complete the frequency tree.



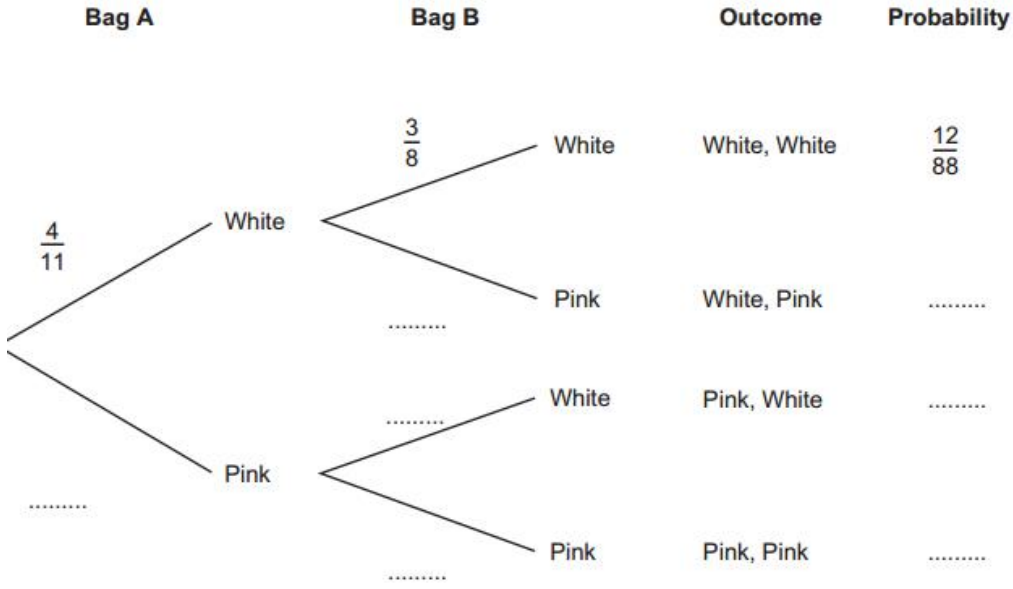
[2]

Bag A and Bag B each contain only white tickets and pink tickets.

One ticket is picked at random from each bag.

(a) Complete the tree diagram.

[4 marks]



(b) Work out the probability of one ticket of each colour being picked.

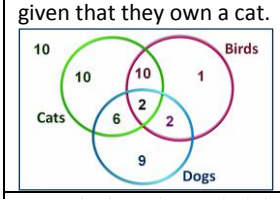
[1 mark]

Homework Sheet 4

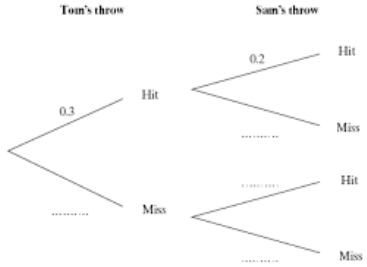
12: Write down the probability that a **man** chosen at random is a man from party A.

	Party A	Party B	Don't know	Total
Men	20			80
Women		40	20	
Total			50	200

2: The Venn diagram shows the pets owned by 50 pupils. Write down the probability that a pupil chosen at random owns a dog given that they own a cat.



C3: Calculate the probability that at least one throw is a hit.



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C6: y is inversely proportional to x. When $y = 11$, $x = 3$. Find y when $x = 5$.

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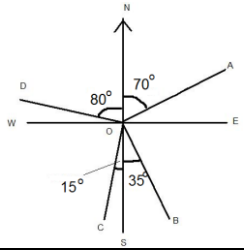
C8: The equation $0 = x^3 + x^2 - 5x - 1$ has 3 solutions. The iterative formula $u_{n+1} = \sqrt[3]{-u_n{}^2 + 5u_n + 1}$ can find two of the solutions. Use $u_1 = 1$ and solve the equation to 2 dp.

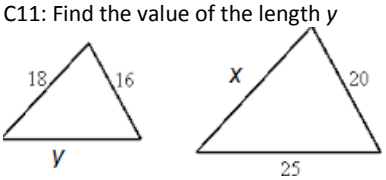
9: Describe the locus of the points equidistant from two parallel lines.

C10: Write down the bearing of D from O.

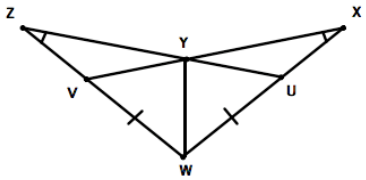


Mark:

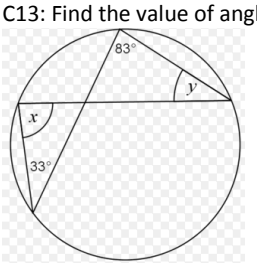
C11: Find the value of the length y



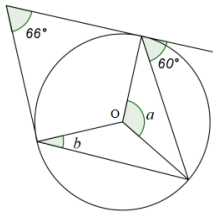
12: Prove that triangle WYX and WYZ are congruent.



C13: Find the value of angle x



C14: Find the value of b



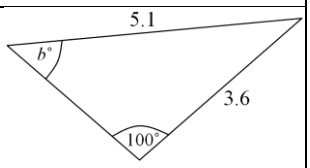
C15: 5 miles = 8 km. A conversion graph is to be drawn to convert miles to km. If miles are on the vertical axis, work out the gradient of the graph.

C16: A rectangle has an area of 60 cm^2. A graph is drawn of all possible lengths and widths. Fill in the missing coordinate value.

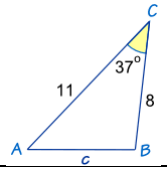
(....., 7)

C17: A car starts with 60 litres of fuel and drives for 7 hours 15 minutes. At the end of the time the car has 51.3 litres of fuel. Find the average rate of fuel loss. State the units of your answer.

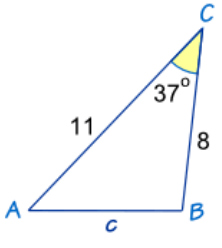
C18: Find the value of b



C19: Find the value of c.



C20: Find the area of the triangle.



Effort:

y is directly proportional to the square of *x.*
When $y = 5$, $x = 4$.
Find the value of *y* when $x = 8$.

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

Answer .....

(Total 3 marks)

The area of the screen of a television set is *A* square inches.
The length of the diagonal of the screen is *d* inches.
A is directly proportional to the square of *d*.

A television set with an area of 90 square inches has a diagonal of length 15 inches.

(b) Find the area of the screen of a television set with a diagonal of length 20 inches.

.....

.....

Answer ..... square inches

(1)

(c) Another television set has a screen with an area of 250 square inches.

Find the length of its diagonal.

.....

.....

.....

.....

Answer ..... inches

(3)

y is directly proportional to the cube of x.

$y = 12$ when $x = 2$

Work out the value of y when $x = 10$

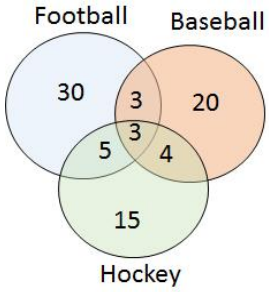
[3 marks]

Homework Sheet 5

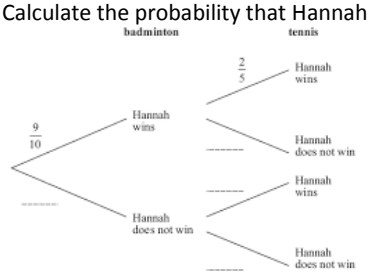
1: Complete the sample space.

	French	German	Spanish	Total
Female	15			39
Male		17		41
Total	31	28		80

2: Find the probability that a person plays all 3 sports.



3: Calculate the probability that Hannah wins both games.



4: A bag has 4 green and 5 yellow counters. Romeo takes a counter, and puts it to one side. He then takes a second counter. Find the probability that both counters are green.

C5: y is proportional to x^3. When $y = 11$, $x = 3$. Find y when $x = 5$.

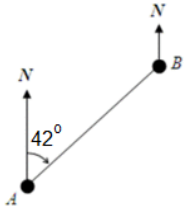
C6: y is inversely proportional to x^3. When $y = 11$, $x = 3$. Find y when $x = 5$.

C7: Use trial and improvement to solve the equation $x^3 + 2x = 50$. Start with $x = 3$. Give your answer to 1 dp.

C8: The equation $0 = x^3 + x^2 - 5x - 1$ has 3 solutions. The iterative formula $u_{n+1} = \sqrt[3]{-u_n{}^2 + 5u_n + 1}$ can find two of the solutions. Use $u_1 = -2$ and solve the equation to 2 dp.

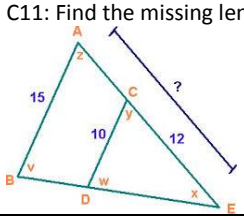
9: Describe the locus of all points less than 3 cm from a given point.

C10: Work out the bearing of A from B.

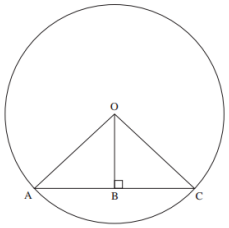


Mark:

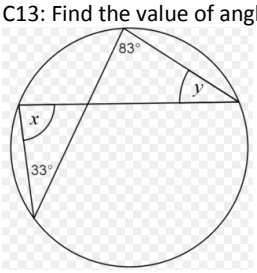
C11: Find the missing length marked with a ?



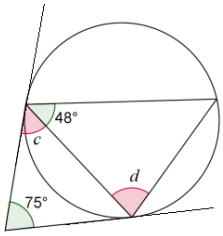
12: If O is the centre of the circle, prove that triangle OAB is congruent to triangle OCB



C13: Find the value of angle y



C14: Find the value of c

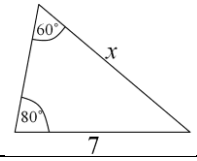


C15: 5 kg = 11 lbs. A conversion graph is to be drawn to convert kg to lbs. If kg is on the horizontal axis, work out the gradient of the graph.

C16: A lottery prize fund is shared equally between all winners. The fund is £800000. A graph is drawn to show the possible winning amounts. Fill in the missing coordinate value: (4,)

C17: A water tank has 12 litres of water. Over 8 hours the volume of water increases to 22 litres. Find the average rate of increase. State the units of your answer.

C18: Find the value of x



C19: Two sides of a triangle are separated by an angle of 32°. Find the third side of the triangle.

C20: Two sides of a triangle are separated by an angle of 32°. Find the area of the triangle.

Effort:

Exam Question Homework: Algebraic Inverse Proportion

G is inversely proportional to $\sqrt{H}$.

When $H = 25$ $G = 3$

Work out an equation linking G and H.

[3 marks]

$P = \frac{45}{Q^2}$ and $Q = \frac{3}{\sqrt{R}}$ where P, Q and R are positive numbers.

Show that $P = kR$ where k is an integer.

[3 marks]

P is inversely proportional to *Q*.

When *P* = 100, *Q* = 32

Calculate the value of *Q* when *P* is twice as big as *Q*.

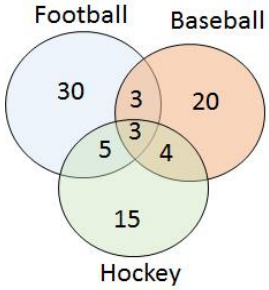
(4)

Homework Sheet 6

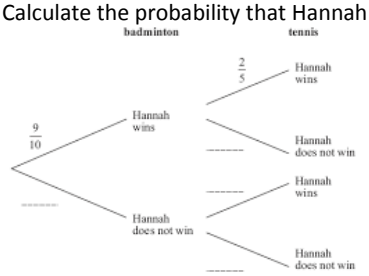
1: Write down the probability that a person chosen at random is female.

	French	German	Spanish	Total
Female	15			39
Male		17		41
Total	31	28		80

2: Find the probability that a person only plays football.



3: Calculate the probability that Hannah wins neither of the games.



4: A bag has 4 green and 5 yellow counters. Romeo takes a counter, and puts it to one side. He then takes a second counter. Find the probability that both counters are yellow.

C5: *y* is proportional to √*x*. When *y* = 11, *x* = 3. Find *y* when *x* = 5.

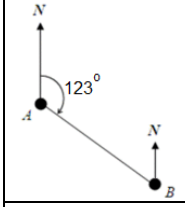
C6: *y* is inversely proportional to √*x*. When *y* = 11, *x* = 3. Find *y* when *x* = 5.

C7: Use trial and improvement to solve the equation $x^3 + 2x = 50$. Start with *x* = 3. Give your answer to 2 dp.

C8: The equation $0 = x^3 + x^2 - 5x - 1$ has 3 solutions. The iterative formula $u_{n+1} = \frac{{u_n}^3 + {u_n}^2 - 1}{5}$ can find one of the solutions. Use $u_1 = 0$ and solve the equation to 2 dp.

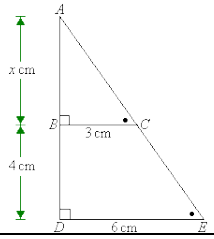
9: Describe the locus of points equidistant from two points.

C10: Work out the bearing of *A* from *B*.

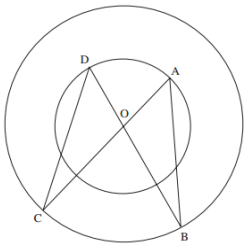


Mark:

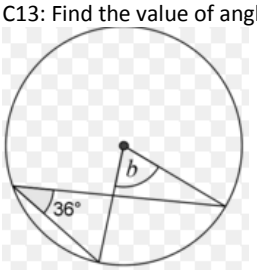
C11: Find the value of the length marked *x*



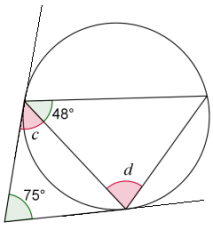
12: If O is the centre of both circles, prove that triangle OAB is congruent to triangle ODC.



C13: Find the value of angle *b*



C14: Find the value of *d*

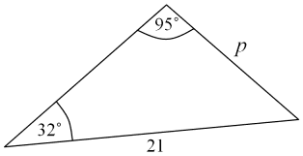


C15: 5 kg = 11 lbs. A conversion graph is to be drawn to convert kg to lbs. If kg is on the vertical axis, work out the gradient of the graph.

C16: A lottery prize fund is shared equally between all winners. The fund is £800000. A graph is drawn to show the possible winning amounts. Fill in the missing coordinate value: (, 20000)

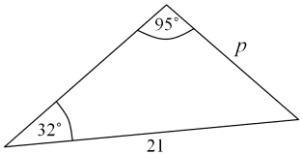
C17: A water tank has 12 litres of water. Over 12 hours the volume of water increases to 15 litres. Find the average rate of increase. State the units of your answer.

C18: Find the value of *p*



C19: A triangle has sides of 6 cm, 7cm and 10 cm. Find the size of the angle between the two smallest sides.

C20: Find the area of the triangle.



Effort:

x is a number such that $x(x - 1)(x + 2) = 40$

Use trial and improvement to find a solution for x.
Give your answer to 1 decimal place.

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Answer x = ...

(Total 4 marks)

Parveen is using trial and improvement to find a solution to the equation

$$x^3 + 7x = 30$$

This table shows her first two trials.

x	$x^3 + 7x$	Comment
2	22	Too small
3	48	Too big

Continue the table to find a solution to the equation.

Give your answer to 1 decimal place.

Answer .....

(Total 3 marks)

Dario is using trial and improvement to find a solution to the equation

$$x + \frac{1}{x} = 5$$

The table shows his first trial.

x	$x + \frac{1}{x}$	**Comment**
4	4.25	Too low

Continue the table to find a solution to the equation.
Give your answer to 1 decimal place.

Answer x = ...

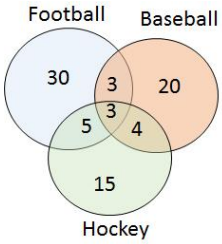
(Total 4 marks)

Homework Sheet 7

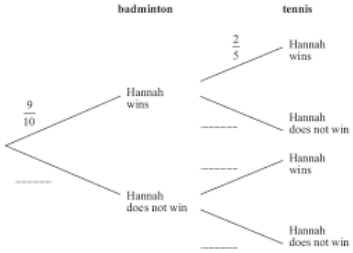
1: Write down the probability that a person chosen at random studies German.

	French	German	Spanish	Total
Female	15			39
Male		17		41
Total	31	28		80

2: Find the probability that a person only plays baseball.



3: Calculate the probability that Hannah wins exactly one of the games.



4: A bag has 4 green and 5 yellow counters. Romeo takes a counter, and puts it to one side. He then takes a second counter. Find the probability that both counters are the same colour.

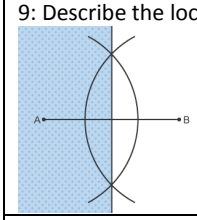
C5: *y* is proportional to *x*. When *y* = ½, *x* = ⅝. Find *y* when *x* = 5.

C6: *y* is inversely proportional to *x*. When *y* = ½, *x* = ⅝. Find *y* when *x* = 5.

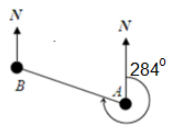
C7: Use trial and improvement to solve the equation $x^3 - 10x = 50$. Start with *x* = 5. Give your answer to 1 dp.

C8: The equation $0 = x^3 - 5x - 1$ has 3 solutions. The iterative formula $u_{n+1} = \frac{u_n{}^3 - 1}{5}$ can find one of the solutions. Use $u_1 = 0$ and solve the equation to 2 dp.

9: Describe the locus of the points in this diagram.

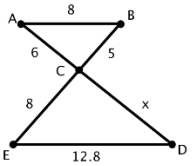


C10: Work out the bearing of *A* from *B*.

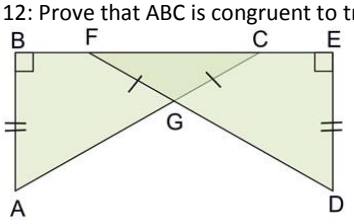


Mark:

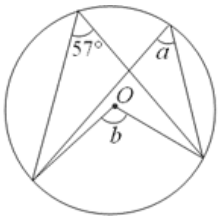
C11: Calculate the length of *x*



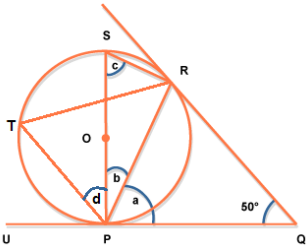
12: Prove that ABC is congruent to triangle DEF.



C13: Find the size of angle *a*



C14: Find the value of *a*

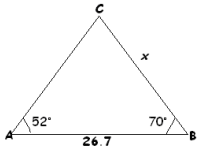


C15: 2 gallons = 9 litres. A conversion graph is to be drawn to convert gallons to litres. If gallons are on the horizontal axis, work out the gradient of the graph.

C16: A lottery prize fund is shared equally between all winners. The fund is £800000. A graph is drawn to show the possible winning amounts. Fill in the missing coordinate value: (7,)

C17: A water tank has 12 litres of water. Over 18 hours the volume of water increases to 21 litres. Find the average rate of increase. State the units of your answer.

C18: Find the value of *x*



C19: A triangle has two sides of 8 cm separated by an angle of 40°. Find the length of the third side.

C20: A triangle has two sides of 8 cm separated by an angle of 40°. Find the area of the triangle.

Effort:

Exam Question Homework: Iterative methods

$$f(x) = 2x^3 + 4x - 9.$$

Use the iterative formula $x_{n+1} = \sqrt[3]{4.5 - 2x_n}$, with $x_0 = 1.2$, to find the root of $f(x) = 0$ correct to 2 decimal places.

The equation $x^3 - 7x - 11 = 0$ has a real root in the interval (3, 4).

Using the iterative formula $x_{n+1} = \sqrt{7 + \frac{11}{x_n}}$, with $x_0 = 3.2$, find x_1, x_2 and x_3, giving the value of x_3 correct to 2 decimal places.

$$f : x \to 2^x + x^3 - 5, \ x \in \mathbb{R}.$$

There is a solution of the equation $f(x) = 0$ in the interval $1.3 < x < 1.4$

a Using the iterative formula $x_{n+1} = \sqrt[3]{5 - 2^{x_n}}$, with $x_0 = 1.4$, find x_1, x_2, x_3 and x_4.

b Hence write down an approximation for this solution of the equation $f(x) = 0$ to an appropriate degree of accuracy.

Exam Question Holiday Homework:

In a game a player keeps rolling an ordinary, fair, six-sided dice.

The player stops when he rolls the same number twice in a row.

For example, 4, 6, 1, 3, 3 stops on the fifth roll.

Work out the probability that a player stops on the **third** roll.

[2 marks]

Dan has 10 shirts.
6 are white, 3 are blue and 1 is grey.

He has 8 ties.
4 are blue, 2 are grey and 2 are red.

He chooses one shirt and one tie at random.

Work out the probability that the shirt and tie are the same colour.

[4 marks]

P is directly proportional to Q.

Q is inversely proportional to R.

When $P = 20$, $Q = 5$ and $R = 6$

Work out the value of P when $R = 10$

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$P =$ ..... *(3 marks)*

In a hotel, the bedrooms are all the same size.
4 painters are needed to paint 10 bedrooms in 5 days.

How many painters are needed to paint 12 bedrooms in 3 days?

[4 marks]

$$f(x) = x^5 - 10x^3 + 4.$$

The equation $f(x) = 0$ can be rearranged into the iterative form $x_{n+1} = \sqrt[3]{\frac{a}{b - x_n^2}}$.

a Find the values of the constants a and b in this formula.

The equation $f(x) = 0$ has another root in the interval $0 < x < 1$.

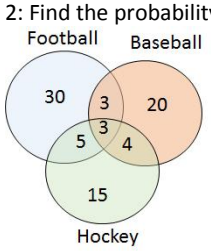
b Using the iteration formula with your values from part **b** and the starting value $x_0 = 1$, find the value of this root correct to 3 decimal places.

Homework Sheet 8

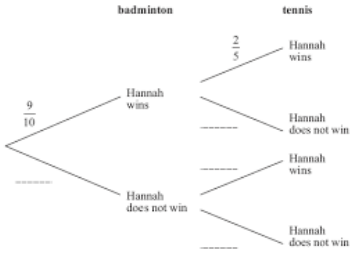
1: Write down the probability that a person chosen at random doesn't study French.

	French	German	Spanish	Total
Female	15			39
Male		17		41
Total	31	28		80

2: Find the probability that a person only plays hockey.



3: Calculate the probability that Hannah wins at least one of the games.



4: A bag has 4 green and 5 yellow counters. Romeo takes a counter, and puts it to one side. He then takes a second counter. Find the probability that both counters are different colours.

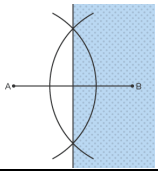
C5: y is proportional to x^2. When y = ½, x = ⅗. Find y when x = 5.

C6: y is inversely proportional to x^2. When y = ½, x = ⅗. Find y when x = 5.

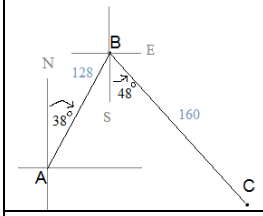
C7: Use trial and improvement to solve the equation $x^3 - 10x = 50$. Start with x = 5. Give your answer to 2 dp.

C8: The equation $0 = x^3 - 5x - 1$ has 3 solutions. The iterative formula $u_{n+1} = \sqrt[3]{5u_n + 1}$ can find two of the solutions. Use u_1 = 3 and solve the equation to 2 dp.

9: Describe the locus of points shown in this diagram.

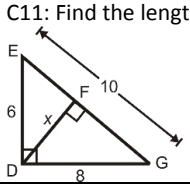


C10: Work out the bearing of C from B.

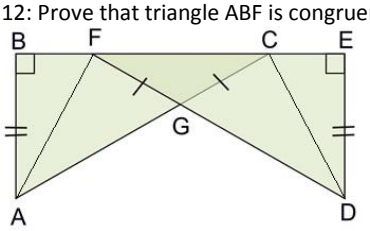


Mark:

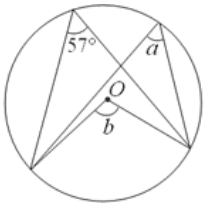
C11: Find the length x



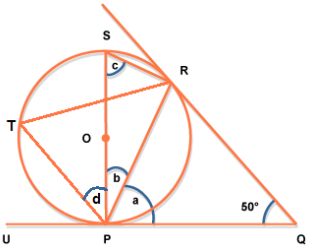
12: Prove that triangle ABF is congruent to DEC.



C13: Find the size of angle b



C14: Find the value of a

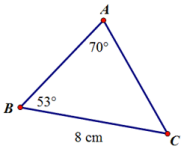


C15: 2 gallons = 9 litres. A conversion graph is to be drawn to convert gallons to litres. If gallons are on the vertical axis, work out the gradient of the graph.

C16: A lottery prize fund is shared equally between all winners. The fund is £800000. A graph is drawn to show the possible winning amounts. Fill in the missing coordinate value: (,£15384.62)

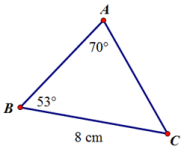
C17: A water tank has 12 litres of water. Over 8 hours the volume of water increases to 22 litres. Find the average rate of increase. Give your answer in ml per minute.

C18: Find the value of side AC.



C19: A triangle has sides of 4 cm, 6 cm and 9 cm. Find the angle between the two longest sides.

C20: Find the area of the triangle.



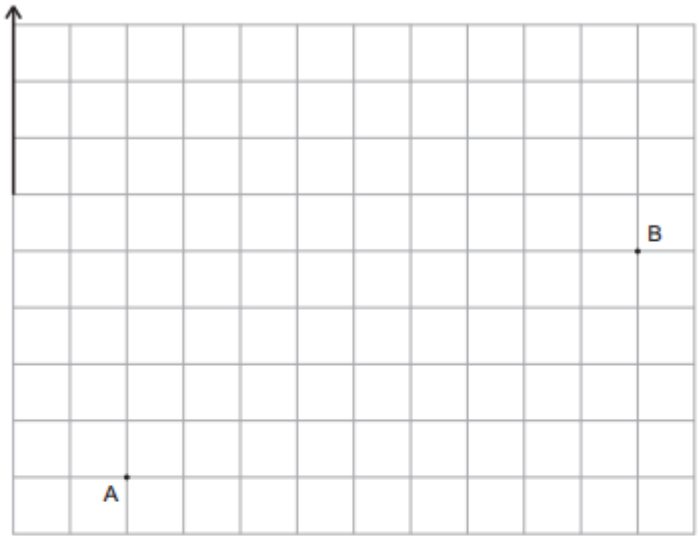
Effort:

Exam Question Homework: Loci and Bearings

The scale diagram shows the positions of ship A and ship B at 9 am

Scale 1 cm represents 5 km

North



Ship A is travelling on a bearing of 045°

Ship B is travelling on a bearing of 270°

On the diagram, show the point where the paths of the ships cross.
Label the point P.
You **must** show the path of each ship.

[2 marks]

A lighthouse is

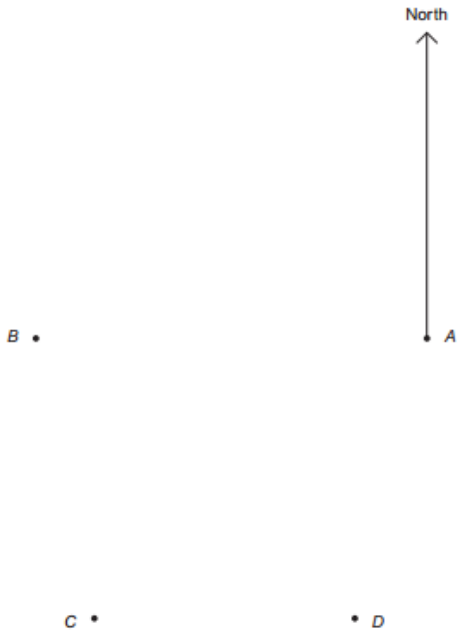
- 35 km from where ship A is at 9 am
- 40 km from where ship B is at 9 am

Using compasses, show the position of the lighthouse on the diagram.
Label the point L.

[2 marks]

The scale drawing shows the positions of towns *A*, *B*, *C* and *D*.

Scale 1 cm represents 5 km



A helicopter flies directly from *A* to *C*.

On what bearing does the helicopter fly?

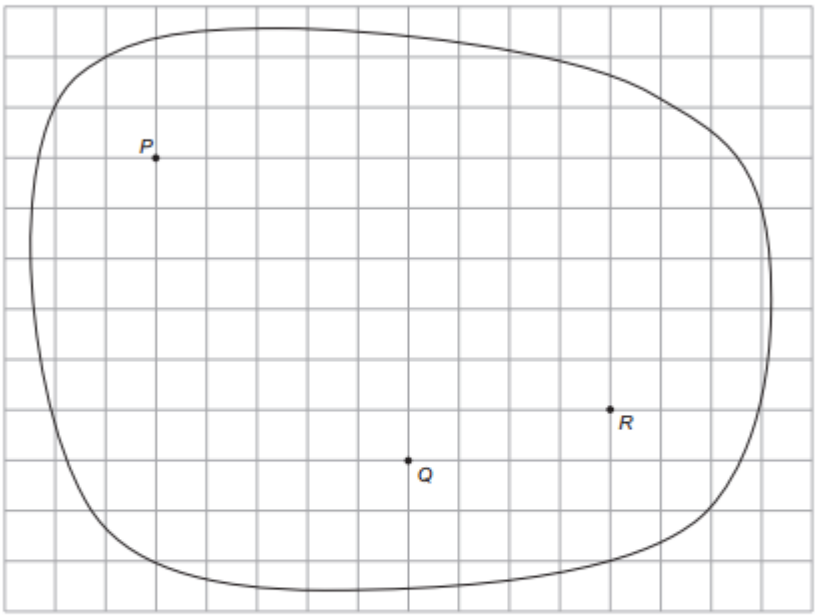
[1 mark]

Answer ..... °

You will need a ruler and compasses to answer this question.

The scale drawing shows the positions of three trees, *P*, *Q* and *R* on an island.

Scale 1 cm represents 100 metres



Some treasure is buried

- less than 500 metres from *P*
- less than 750 metres from *R*
- nearer to *P* than to *Q*.

Shade the region where the treasure could be.

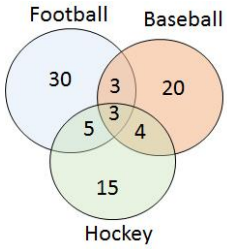
[3 marks]

Homework Sheet 9

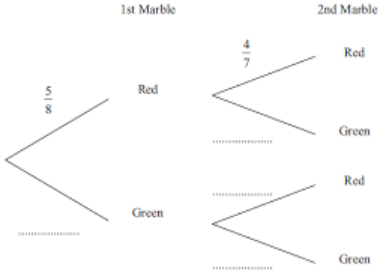
1: Write down the probability that a male chosen at random studies German.

	French	German	Spanish	Total
Female	15			39
Male		17		41
Total	31	28		80

2: Find the probability that a person plays football.



3: A bag has 5 red and 3 green marbles inside. A marble is removed, and then a second is removed. Calculate the probability that both marbles are red.



4: In the game of frustration you cannot begin playing until you score a roll a 6. Find the probability that a person begins playing after the first die roll.

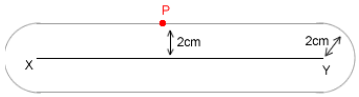
C5: *y* is proportional to √*x*. When *y* = ½, *x* = ⅝. Find *y* when *x* = 5.

C6: *y* is inversely proportional to √*x*. When *y* = ½, *x* = ⅝. Find *y* when *x* = 5.

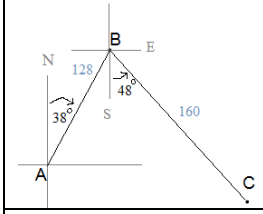
C7: Use trial and improvement to solve the equation $x^3 + 10x = 50$. Start with *x* = 2. Give your answer to 1 dp.

C8: The equation $0 = x^3 - 5x - 1$ has 3 solutions. The iterative formula $u_{n+1} = \sqrt[3]{5u_n + 1}$ can find two of the solutions. Use u_1 = -3 and solve the equation to 2 dp.

9: Describe the locus of points shown in this picture

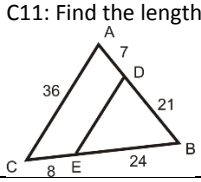


C10: Work out the bearing of *B* from *C*.

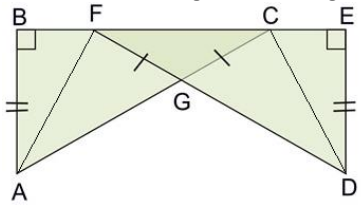


Mark:

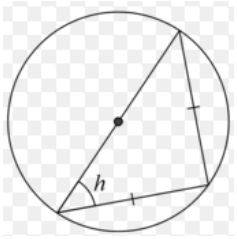
C11: Find the length DE



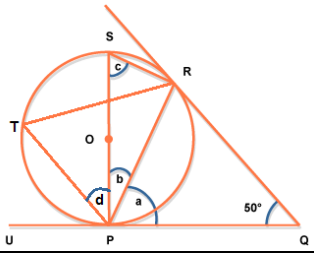
12: Prove that triangle AFG is congruent to DCG.



C13: Find the value of angle *h*



C14: Find the value of *b*

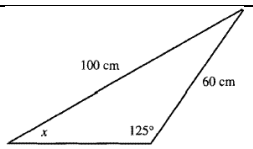


15: 2.5 cm = 1 inch. A conversion graph is drawn to convert cm to inches. If inches is on the horizontal axis write down what the gradient represents.

C16: Jeff travels 12 miles to work. He plots a graph of his average speed in mph against the time in minutes it takes. Fill in the missing coordinate value. (, 40)

C17: At the beginning of a day the price of oil is $44 a barrel. After half an hour trading the price has fallen to $43.65. Give the average rate of change of the price in cents per minute.

C18: Find the value of *x*.



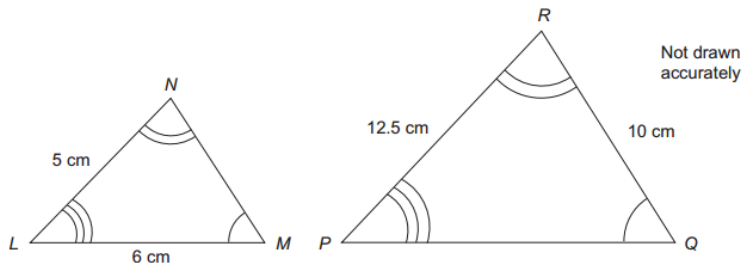
C19: A triangle has sides of 2 cm and 12 cm separated by an angle of 12°. Find the value of the third side.

C20: A triangle has sides of 2 cm and 12 cm separated by an angle of 12°. Find the area of the triangle.

Effort:

Exam Question Homework: Similarity and Congruence

Triangles *LMN* and *PQR* are similar.



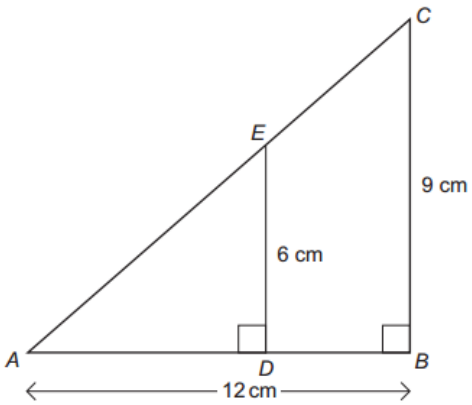
Not drawn accurately

Work out the length *PQ*.

[2 marks]

ABC and *ADE* are similar triangles.

AB = 12 cm, *DE* = 6 cm and *BC* = 9 cm



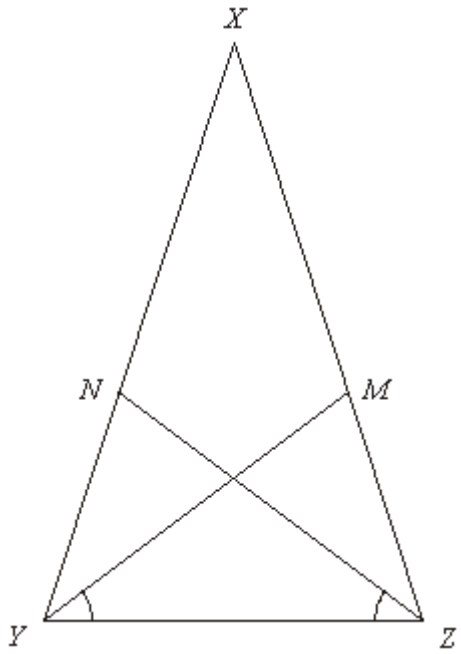
Not drawn accurately

Calculate the length of *AD*.

[3 marks]

XYZ is an isosceles triangle in which *XZ* = *XY*

M and *N* are points on *XZ* and *XY* such that angle *MYZ* = angle *NZY.*



Prove that triangles *YMZ* and *ZNY* are congruent.

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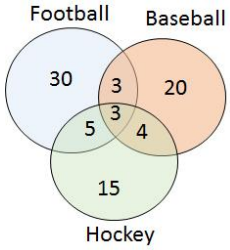
(Total 4 marks)

Homework Sheet 10

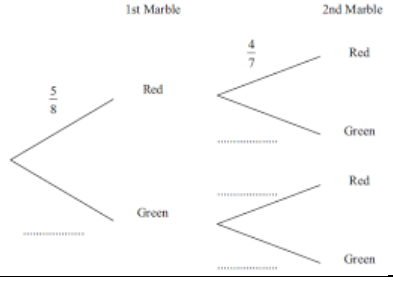
1: Complete the sample space.

	Stalls	Circle	Balcony	Total
Adults	36	39		112
Children	41		31	
Total		60		

2: Find the probability that a person plays baseball.



3: A bag has 5 red and 3 green marbles inside. A marble is removed, and then a second is removed. Calculate the probability that both marbles are green.



4: In the game of frustration you cannot begin playing until you score a roll a 6. Find the probability that a person begins playing after the second die roll.

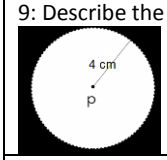
C5: y is proportional to x. When $y = 7$, $x = -3$. Find y when $x = 5$.

C6: y is inversely proportional to x. When $y = 7$, $x = -3$. Find y when $x = 5$.

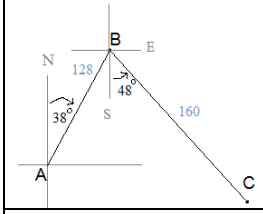
C7: Use trial and improvement to solve the equation $x^3 + 10x = 50$. Start with $x = 2$. Give your answer to 2 dp.

C8: The equation $0 = x^3 - 3x^2 + 1$ has 3 solutions. The iterative formula $u_{n+1} = \sqrt[3]{3u_n{}^2 - 1}$ can find one of the solutions. Use $u_1 = 2$ and solve the equation to 2 dp.

9: Describe the locus of points in this diagram.

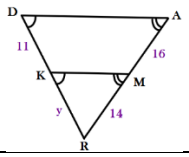


C10: Work out the bearing of *C* from *A*.

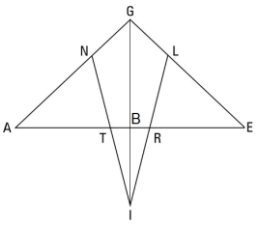


Mark:

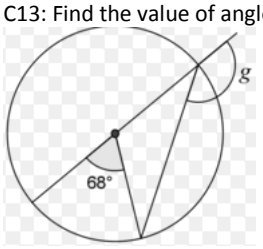
C11: Find the value of y



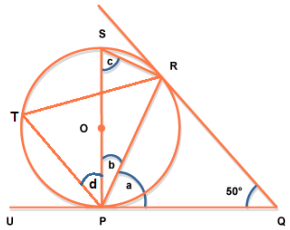
12: Given that AG = EG and NI = LI, prove that AGB is congruent to EGB.



C13: Find the value of angle g



C14: Find the value of c

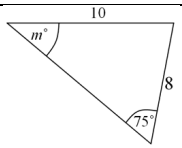


15: 5 miles = 8 km. A conversion graph is to be drawn to convert miles to km. If miles are on the horizontal axis, write down what the gradient represents.

C16: Jeff travels 12 miles to work. He plots a graph of his average speed in mph against the time in minutes it takes. Fill in the missing coordinate value. (25,)

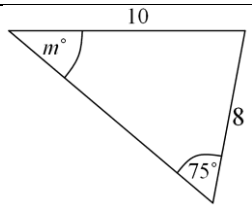
C17: At the beginning of a day the price of oil is \$44 a barrel. After an hour trading the price has fallen to \$43.45. Give the average rate of change of the price in cents per minute.

C18: Find the value of m



C19: A triangle has three sides of 4 cm, 15 cm and 16 cm. Find the angle between the shortest and longest sides.

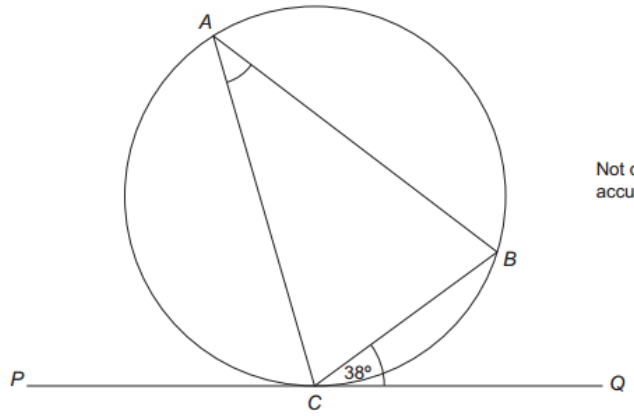
C20: Find the area of the triangle.



Effort:

Exam Question Homework: Circle Theorems

PQ is a tangent to the circle at *C*.
Angle *BCQ* = 38°



Not drawn accurately

Write down the size of angle *CAB*.
Give a reason for your answer.

[2 marks]

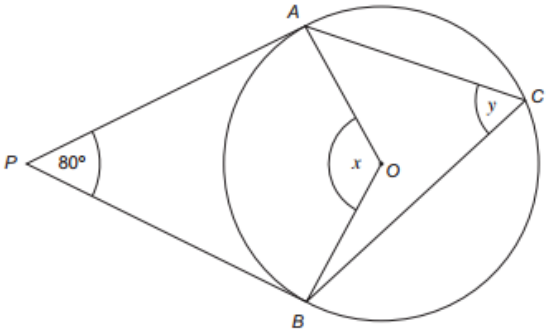
Answer _____ degrees

Reason _____

_____

Points *A*, *B* and *C* lie on the circumference of a circle, centre *O*.
PA and *PB* are tangents to the circle.

Angle *APB* = 80°



Not drawn accurately

Work out the size of angle x.

[3 marks]

_____

_____

_____

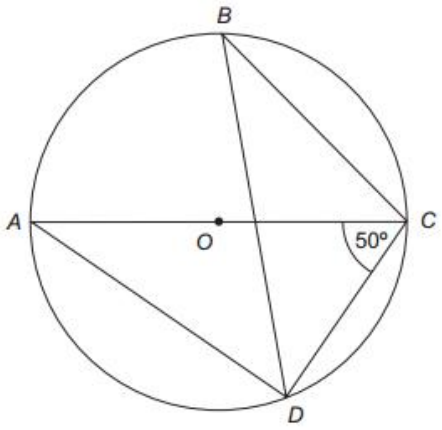
_____

Answer _____ degrees

Work out the size of angle y.

[1 mark]

A, *B*, *C* and *D* are points on the circumference of a circle, centre *O*.
AC is a diameter.
Angle *ACD* = 50°



Not drawn accurately

Write down the size of angle *ADC*.

[1 mark]

Answer ..... degrees

Work out the size of angle *DBC*.

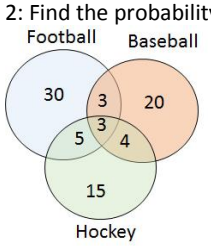
[1 mark]

Homework Sheet 11

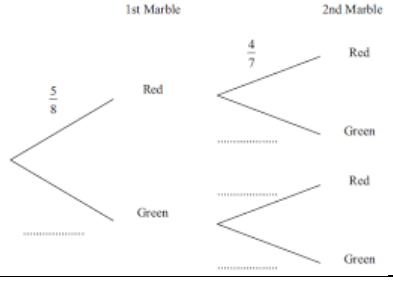
1: Write down the probability that an adult chosen at random is in the circle.

	Stalls	Circle	Balcony	Total
Adults	36	39		112
Children	41		31	
Total		60		

2: Find the probability that a person plays hockey.



3: A bag has 5 red and 3 green marbles inside. A marble is removed, and then a second is removed. Calculate the probability that exactly one of the marbles are red.



4: In the game of frustration you cannot begin playing until you score a roll a 6. Find the probability that a person begins playing after the third die roll.

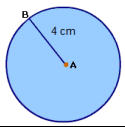
C5: y is proportional to x^2. When $y = 7$, $x = -3$. Find y when $x = 5$.

C6: y is inversely proportional to x^2. When $y = 7$, $x = -3$. Find y when $x = 5$.

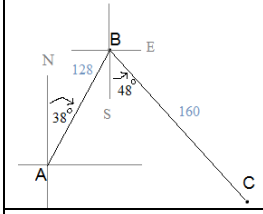
C7: Use trial and improvement to solve the equation $x^3 - 5x = 15$. Start with $x = 3$. Give your answer to 1 dp.

C8: The equation $0 = x^3 - 3x^2 + 1$ has 3 solutions. The iterative formula $u_{n+1} = \sqrt{\frac{u_n{}^3+1}{3}}$ can find one of the solutions. Use $u_1 = 0$ and solve the equation to 2 dp.

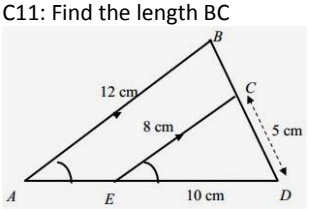
9: Describe the locus of points shown in this diagram.



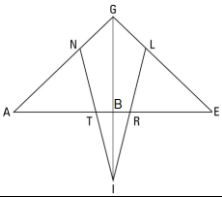
C10: Work out the bearing of *A* from *C*.



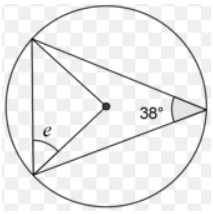
C11: Find the length BC



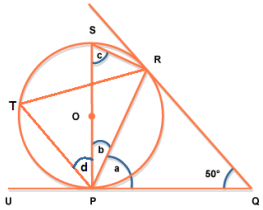
12: Given that AG = EG and NI = LI, prove that ANT is congruent to ELR.



C13: Find the value of angle *e*



C14: Find the value of *d*

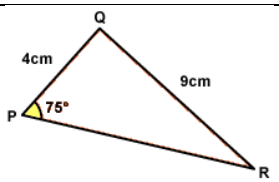


15: 5 kg = 11 lbs. A conversion graph is to be drawn to convert kg to lbs. If kg is on the horizontal axis, write down what the gradient represents.

C16: Jeff travels 12 miles to work. He plots a graph of his average speed in mph against the time in minutes it takes. Fill in the missing coordinate value. (, 30)

C17: At the beginning of a day the price of oil is $44 a barrel. After 6 hours of trading the price has risen to $46.10. Give the average rate of change of the price in cents per minute.

C18: Find the value of angle *PRQ*.



C19: A triangle has sides of 12 cm and 16 cm separated by an angle of 140°. Find the size of the third side.

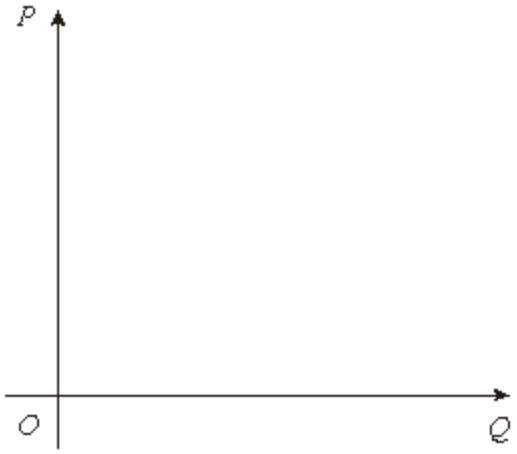
C20: A triangle has sides of 12 cm and 16 cm separated by an angle of 140°. Find the area of the triangle.

Mark:

Effort:

P is inversely proportional to *Q*.
When *P* = 100, *Q* = 32

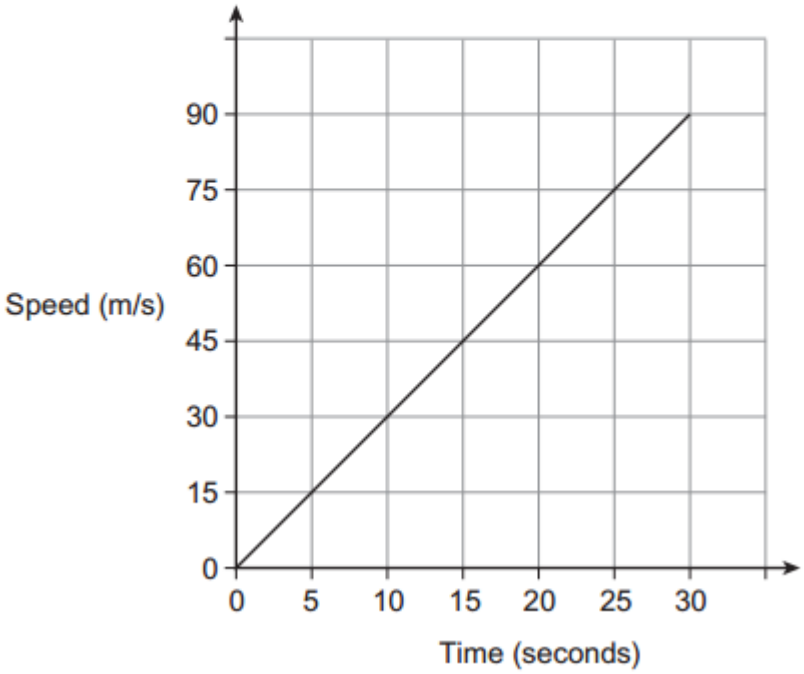
P and *Q* are positive quantities.
Sketch a graph of the relationship between *P* and *Q* on this diagram.



(2)

A plane accelerates along a runway for 30 seconds.

The graph shows the speed-time graph for the plane.



(a) Explain how the graph shows that speed is proportional to time.

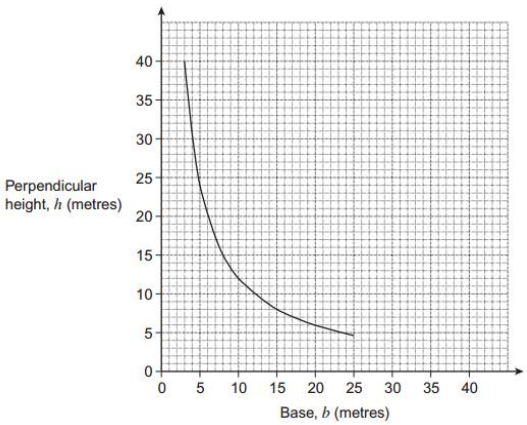
[1 Mark]

(b) Write down a relationship connecting the speed, *s*, in metres per second, and the time, *t*, in seconds.

[2 Marks]

A farmer wants to make a **triangular** enclosure of area 60 m^2.

This graph shows the relationship between the base, b (metres), and the perpendicular height, h (metres), of the triangle.



(a) Explain how the graph shows that the area of the triangle is 60 m^2.

.....

.....

.....

(2 marks)

(b) Complete the graph for values of b up to 40.

.....

.....

.....

(2 marks)

(c) The farmer decides to make the base twice as long as the perpendicular height.

(c) (i) Plot these points on the graph opposite and join them with a straight line.

b	0	20	40
h	0	10	20

(1 mark)

(c) (ii) Use your line to write down approximate values for the base and perpendicular height that the farmer will use.

Base ..... m

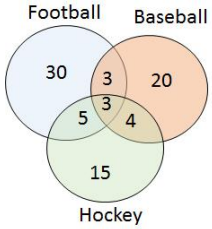
Perpendicular height ..... m *(2 marks)*

Homework Sheet 12

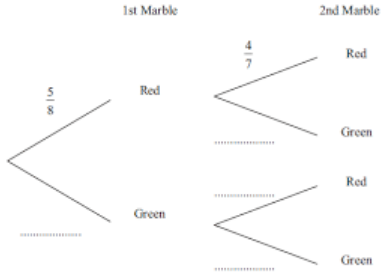
1: Write down the probability that a child chosen at random is in the stalls.

	Stalls	Circle	Balcony	Total
Adults	36	39		112
Children	41		31	
Total		60		

2: Find the probability that a person plays football given that they play baseball.



3: A bag has 5 red and 3 green marbles inside. A marble is removed, and then a second is removed. Calculate the probability that at least one of the marbles are red.



4: In the game of frustration you cannot begin playing until you score a roll a 6. Find the probability that a person begins playing after the first or second die roll.

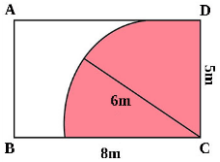
C5: y is proportional to x^3. When $y = 7$, $x = -3$. Find y when $x = 5$.

C6: y is inversely proportional to x^3. When $y = 7$, $x = -3$. Find y when $x = 5$.

C7: Use trial and improvement to solve the equation $x^3 - 5x = 15$. Start with $x = 3$. Give your answer to 2 dp.

C8: The equation $0 = x^3 - 3x^2 + 1$ has 3 solutions. The iterative formula $u_{n+1} = \frac{2u_n{}^3 - 1}{3(u_n{}^2 - u_n)}$ can find one of the solutions. Use $u_1 = -1$ and solve the equation to 2 dp.

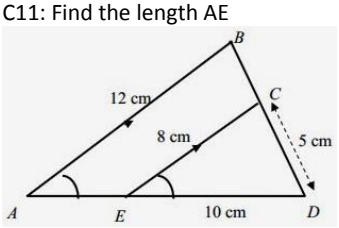
9: Describe the locus of points shown in the diagram.



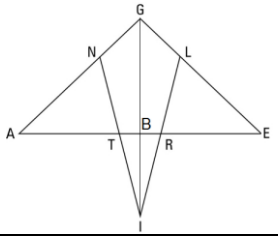
C10: A plane travels on a bearing of 064° for 50 km and then turns to a bearing of 090° for 140 km. Work out the bearing from the start to the end point.

Mark:

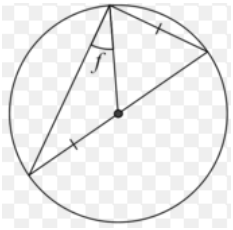
C11: Find the length AE



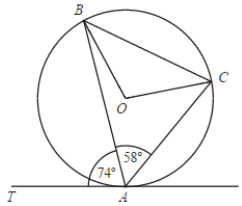
12: Given that AG = EG and NI = LI, prove that NGI is congruent to LGI.



C13: Find the value of angle f



C14: Find the size of angle *BOC*.

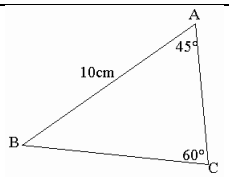


15: 5 kg = 11 lbs. A conversion graph is to be drawn to convert kg to lbs. If kg is on the horizontal axis, work out the gradient of the graph.

C16: Jeff travels 12 miles to work. He plots a graph of his average speed in mph against the time in minutes it takes. Fill in the missing coordinate value. (50,)

C17: The tangent to a curve at the point (3,2) has equation $y = 5 - x$. Find the rate of change of the curve at the point (3,2).

18: Find the value of side *BC*.



C19: A triangle has sides of 8 cm, 8.5 cm and 10 cm. Find the angle between the two shorter sides.

C20: A triangle has sides of 8 cm, 8.5 cm and 10 cm. Find the area of the triangle.

Effort:

Exam Question Homework: Rates of Change

A tank has a volume of 108 000 cm^3

(a) What is the volume of the tank in litres?
Circle your answer.

[1 mark]

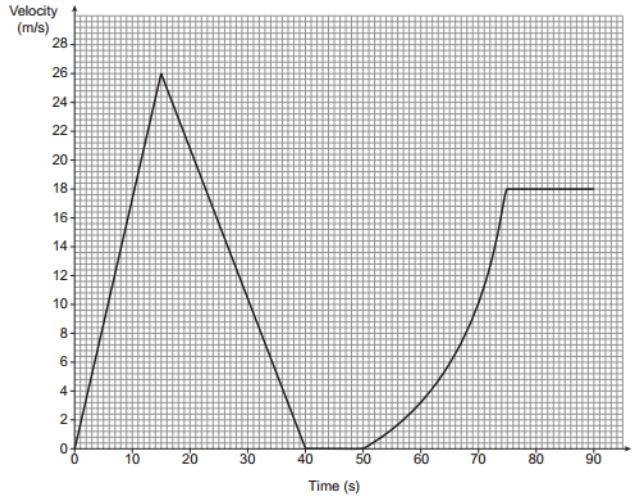
10.8 litres 108 litres 1080 litres 10 800 litres

(b) Water is poured into the tank at a constant rate.
It takes 4 minutes 30 seconds to fill the tank.

Work out the rate at which the water is poured in.
Give your answer in litres per minute.

[2 marks]

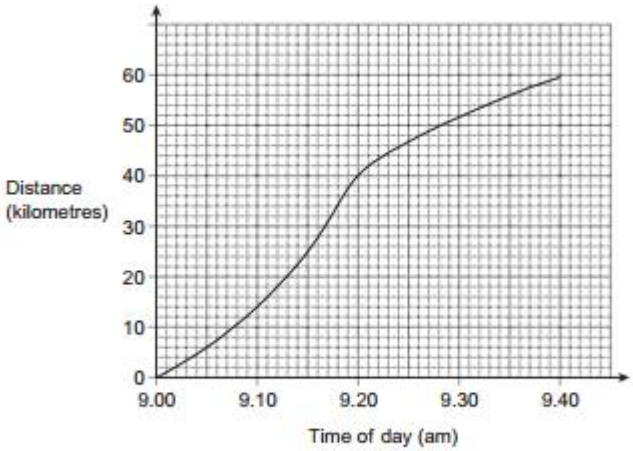
The graph shows the velocity-time graph for the first 90 seconds of a car journey.



Estimate the acceleration of the car at 65 seconds.
You **must** show your working.

[3 marks]

The distance-time graph shows a car journey on a motorway.
Distances are measured in kilometres.



The speed limit for the motorway is 70 miles per hour.

At 9.20 am, was the car travelling at more than 70 miles per hour?
You **must** show your working.

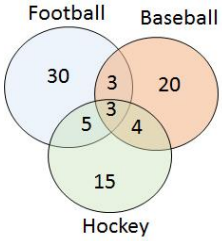
[5 marks]

Homework Sheet 13

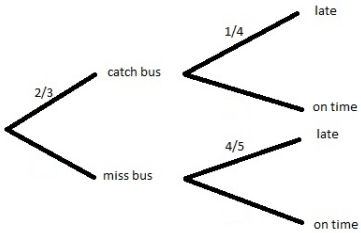
1: Write down the probability that a person chosen at random is in the balcony.

	Stalls	Circle	Balcony	Total
Adults	36	39		112
Children	41		31	
Total		60		

2: Find the probability that a person plays football given that they play hockey.



3: Alan catches a bus to work. The tree diagram shows probabilities about Alan's journey. Calculate the probability that Alan is late to work despite catching the bus.



4: In the game of frustration you cannot begin playing until you score a roll a 6. Find the probability that a person begins playing after the second or third die roll.

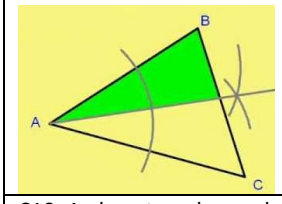
C5: *y* is proportional to *x*. When *y* = 9, *x* = √3. Find *y* when *x* = 5.

C6: *y* is inversely proportional to *x*. When *y* = 9, *x* = √3. Find *y* when *x* = 5.

C7: Use trial and improvement to solve the equation $x^3 + 5x = 15$. Start with *x* = 1. Give your answer to 1 dp.

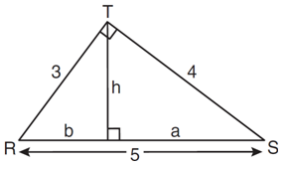
C8: The equation $0 = x^3 - 3x^2 - x + 1$ has 3 solutions. The iterative formula $u_{n+1} = \sqrt{\frac{3u_n{}^2 + u_n - 1}{u_n}}$ can find one of the solutions. Use u_1 = 2 and solve the equation to 2 dp.

9: Describe the locus of the points shown in the diagram.

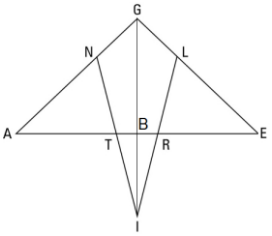


C10: A plane travels on a bearing of 042° for 65 km and then turns to a bearing of 136° for 130 km. Work out the bearing from the start to the end point.

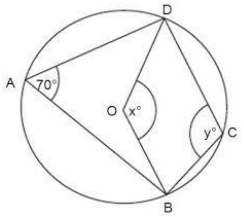
C11: Find the length *a*.



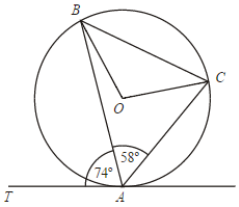
12: Given that AG = EG and NI = LI, prove that BTI is congruent to BRI.



C13: Find the value of *x*



C14: Find the size of angle *OCA*.

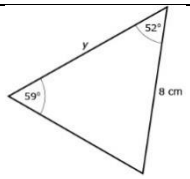


15: 2 gallons = 9 litres. A conversion graph is to be drawn to convert gallons to litres. If gallons are on the horizontal axis, write down what the gradient represents.

C16: Jeff travels 12 miles to work. He plots a graph of his average speed in mph against the time in minutes it takes. Fill in the missing coordinate value. (, 9)

C17: The tangent to a curve at the point (3,2) has passes through the point (7,-1). Find the rate of change of the curve at the point (3,2).

C18: Find the value of *y*.



C19: A triangle has sides of √13, √17 and 3√2. Find the angle between the two shortest sides.

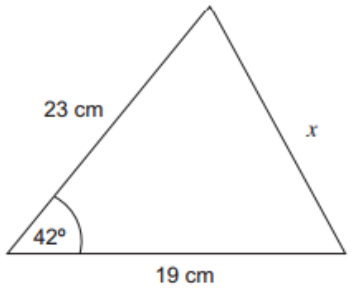
C20: A triangle has sides of √13, √17 and 3√2. Find te area of the triangle.

Mark:

Effort:

Exam Question Homework: Sine and Cosine Rule

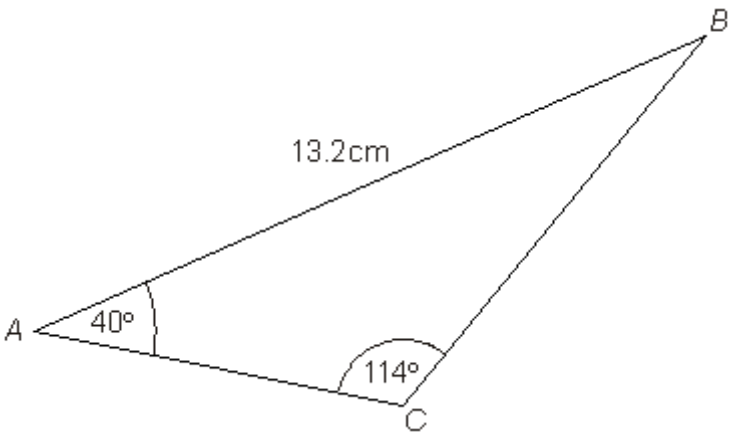
Work out the length x.



Not drawn accurately

[3 marks]

In triangle *ABC* the length of *AB* is 13.2 cm.
Angle *BAC* = 40°
Angle *BCA* = 114°



Not drawn accuratelly

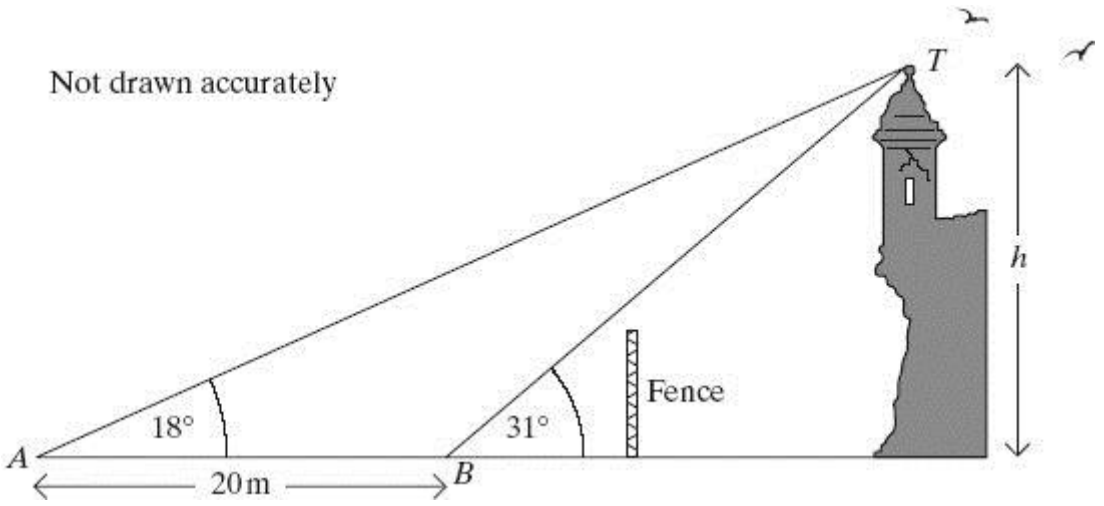
Work out the length of *BC*.
Give your answer to an appropriate degree of accuracy.

(Total 4 marks)

A ruined tower is fenced off for safety reasons.

To find the height of the tower Rashid stands at a point *A* and measures the angle of elevation as 18°.

He then walks 20 metres directly towards the base of the tower to point *B* where the angle of elevation is 31°.

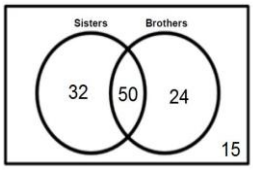


Calculate the height, *h*, of the tower.

(Total 6 marks)

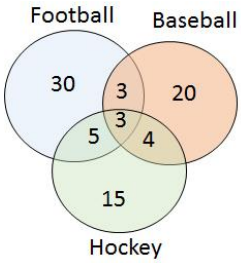
Homework Sheet 14

1: Complete the sample space.

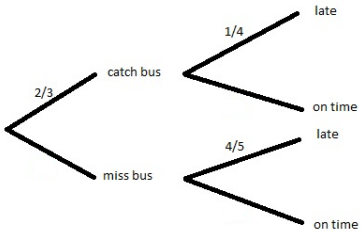


	Have Sisters	Do Not Have Sisters	Total
Have Brothers			
Do Not Have Brothers			
Total			

2: Find the probability that a person plays football or baseball.



3: Alan catches a bus to work. The tree diagram shows probabilities about Alan's journey. Calculate the probability that Alan is on time for work despite missing the bus.



4: In the game of frustration you cannot begin playing until you score a roll a 6. Find the probability that a person begins playing by the third die roll.

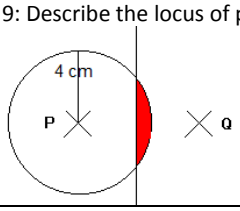
C5: y is proportional to x^3. When $y = 9$, $x = \sqrt{3}$. Find y when $x = 5$.

C6: y is inversely proportional to x^3. When $y = 9$, $x = \sqrt{3}$. Find y when $x = 5$.

C7: Use trial and improvement to solve the equation $x^3 + 5x = 15$. Start with $x = 1$. Give your answer to 2 dp.

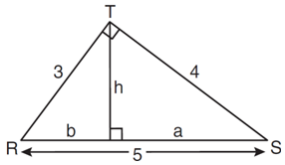
C8: The equation $0 = x^3 - 3x^2 - x + 1$ has 3 solutions. The iterative formula $u_{n+1} = \sqrt{\frac{u_n{}^3 - u_n + 1}{3}}$ can find one of the solutions. Use $u_1 = 0$ and solve the equation to 2 dp.

9: Describe the locus of points shown in this picture.

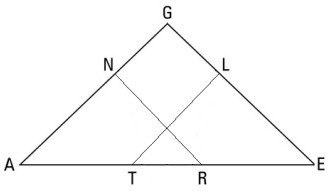


C10: A plane travels on a bearing of 164° for 50 km and then turns to a bearing of 015° for 140 km. Work out the bearing from the start to the end point.

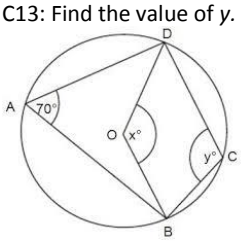
C11: Find the length b.



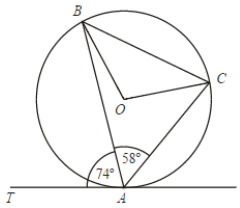
12: Given that AG = EG and NG = LG, prove that ANR is congruent to TLE.



C13: Find the value of y.



C14: Find the size of angle ABO.

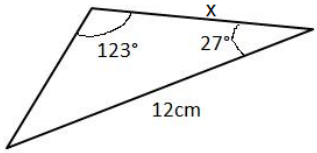


C15: 25 metres = 82 feet. A conversion graph is to be drawn to convert metres to feet. If metres are on the horizontal axis, work out the gradient of the graph.

C16: Jeff travels 12 miles to work. He plots a graph of his average speed in mph against the time in minutes it takes. Fill in the missing coordinate value. (21,)

C17: A curve passes through the points (2.8,0.232); (3,2) and (3.2,4.248). Estimate the rate of change of the curve at (3,2).

C18: Find the value of x.



C19: A triangle has sides of $4\sqrt{5}$ and $\sqrt{21}$ separated by an angle of 42°. Find the size of the third side.

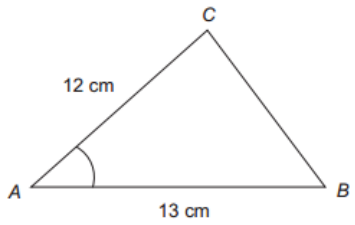
C20: A triangle has sides of $4\sqrt{5}$ and $\sqrt{21}$ separated by an angle of 42°. Find the area of the triangle.

Mark:

Effort:

Exam Question Homework: Advanced Trigonometry

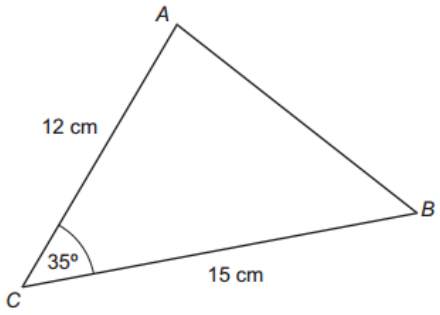
The area of triangle *ABC* is 48 cm^2



Not drawn accurately

Work out the size of angle *CAB*.

[3 marks]



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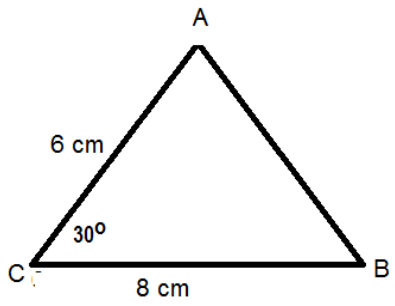
Work out the area of triangle *ABC*.

[2 marks]

Work out the exact area of triangle *ABC*. Show clearly your working.

[3 marks]



Sheet	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mark														

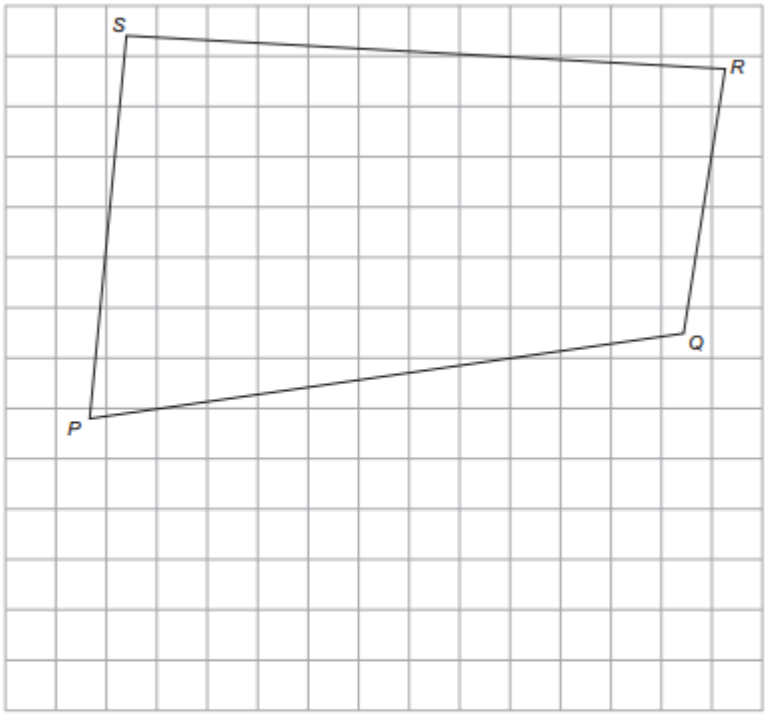
Question	Topic	Homework 1	Homework 2	Homework 3	Homework 4	Homework 5	Homework 6	Homework 7	Homework 8	Homework 9	Homework 10	Homework 11	Homework 12	Homework 13	Homework 14
1	Sample Spaces														
2	Venn Diagrams														
3	Tree Diagrams														
4	AND and OR														
5	Direct Proportion														
6	Inverse Proportion														
7	Trial and Improvement														
8	Iterative methods														
9	Loci														
10	Bearings														
11	Similarity														
12	Congruence														
13	Circle Theorems 1														
14	Circle Theorems 2														
15	Proportion Graphs														
16	Inverse Proportion graphs														
17	Rates of Change														
18	Sine Rule														
19	Cosine Rule														
20	Area and Trigonometry														

Homework 2 Target	
Homework 3 Target	
Homework 4 Target	
Homework 5 Target	
Homework 5 Target	
Homework 6 Target	
Homework 7 Target	
Homework 8 Target	
Homework 9 Target	
Homework 10 Target	
Homework 11 Target	
Homework 12 Target	
Homework 13 Target	
Homework 14 Target	

Exam Question Holiday Homework:

You need a ruler and compasses to answer this question.

PQRS is a plan of a garden.



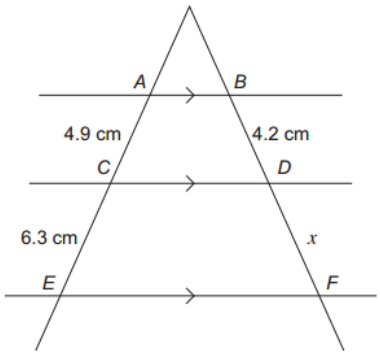
A straight path in the garden

- joins *PQ* to *SR*
- is perpendicular to *PQ*
- is the same distance from *P* and *Q*

Construct the position of the path.

[2 marks]

AB, *CD* and *EF* are parallel.
AC = 4.9 cm, *CE* = 6.3 cm, *BD* = 4.2 cm



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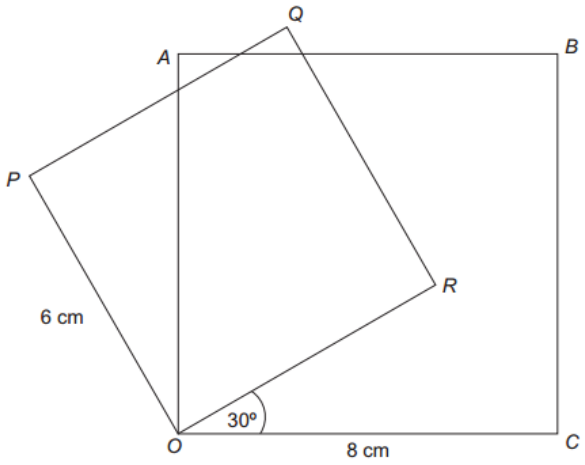
Work out the length *DF*, marked x on the diagram.

[3 marks]

OABC is a square of side 8 cm
OPQR is a square of side 6 cm
Angle *ROC* is 30°



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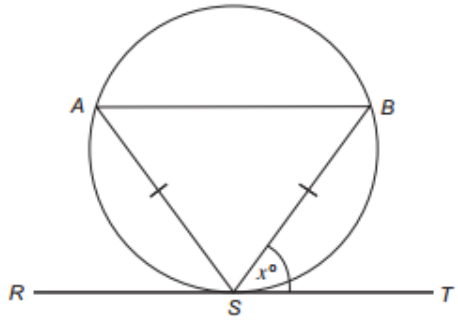
Prove that triangle *ORC* and triangle *OPA* are congruent.

[4 marks]

Fill in the missing reasons in the proof below.

[2 marks]

A, *B* and *S* are points on a circle.
RST is a tangent to the circle.
AS = *BS*
Angle *TSB* = *x*°



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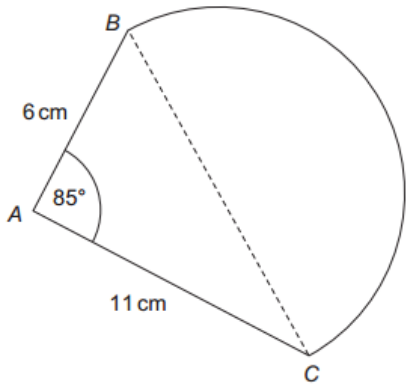
Prove that *AB* is parallel to *RT*.

Angle SAB = x° (.....)

Angle ABS = x° (Base angles in an isosceles triangle are equal)

So, AB is parallel to RT (.....)

This shape is made from a semicircle and a triangle.



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Calculate the perimeter of the shape.

[5 marks]

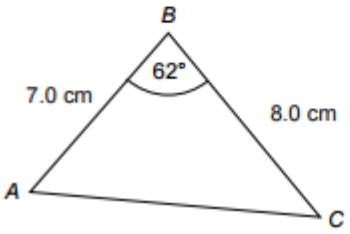
(a) Sophie draws a line 6.0 cm long to the nearest mm.

Which of the following is the upper limit of the length of the line?
Circle the correct answer.

6.04 cm 6.05 cm 6.1 cm 6.5 cm

(1 mark)

(b) Sophie constructs the triangle *ABC* using a ruler and protractor.
She draws *AB* = 7.0 cm, to the nearest mm.
She draws *BC* = 8.0 cm, to the nearest mm.
She draws angle *ABC* = 62° to the nearest degree.



Not drawn accurately

Calculate the greatest possible area of the triangle.

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Answer ..... cm^2 *(4 marks)*