



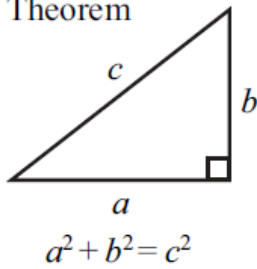
THE ENGLISH COLLEGE IN PRAGUE

YEAR 3

Mathematics Entrance Examination Practice set (B)

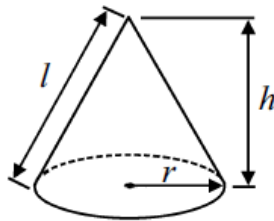
FORMULAE SHEET (*only some of these will be needed)

Pythagoras' Theorem



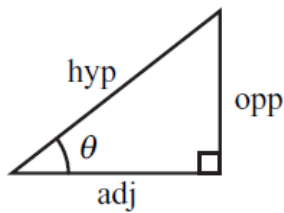
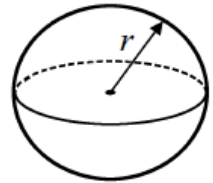
Volume of cone = $\frac{1}{3} \pi r^2 h$

Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3} \pi r^3$

Surface area of sphere = $4 \pi r^2$



adj = hyp \times cos θ

opp = hyp \times sin θ

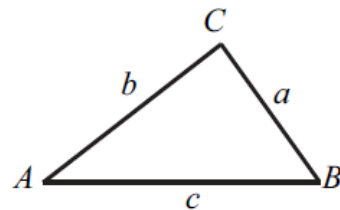
opp = adj \times tan θ

or $\sin \theta = \frac{\text{opp}}{\text{hyp}}$

$\cos \theta = \frac{\text{adj}}{\text{hyp}}$

$\tan \theta = \frac{\text{opp}}{\text{adj}}$

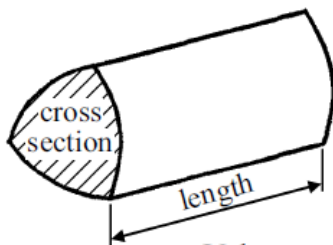
In any triangle ABC



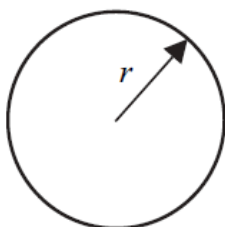
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} ab \sin C$



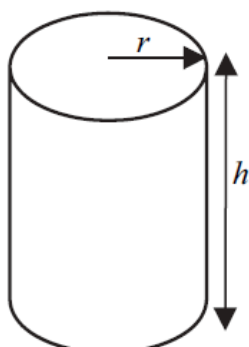
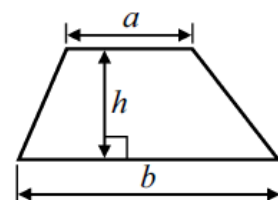
Volume of prism = area of cross section \times length



Circumference of circle = $2 \pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2} (a + b) h$



Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2 \pi r h$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Questions

Q1.

a) Find 30% of 240

.....
(1)

b) Increase 400 by 40%

.....
(1)

c) 45% of the students in a class are girls. If there are 18 girls in the class, calculate how many boys there are in the class.

.....
(2)

(Total for Question is 4 marks)

Q2.

In a sale normal prices are reduced by 20%.

A washing machine has a sale price of £464

By how much money is the normal price of the washing machine reduced?

£

(Total for Question is 3 marks)

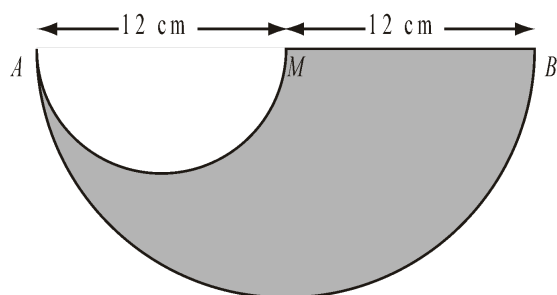
Q3.

Calculate $4\left(\frac{3}{5} + \frac{2}{7}\right)$ showing all the steps in your working

.....

(Total for Question is 3 marks)

Q5.



The shape above is made by removing a small semi-circle from a large semi-circle.

$AM = MB = 12 \text{ cm}$

Calculate the area of the shape.

..... cm^2

(Total for Question is 4 marks)

Q6.

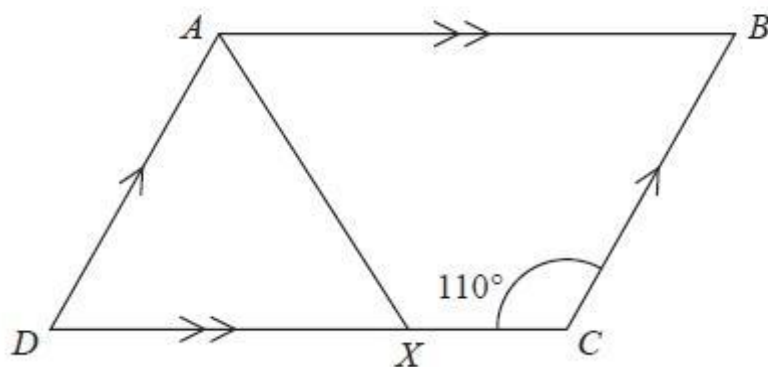


Diagram **NOT**
accurately drawn

$ABCD$ is a parallelogram.

Angle $DCB = 110^\circ$

X is the point on DC such that AX bisects the angle DAB .

Calculate the size of angle AXC .

..... $^\circ$

(Total for Question is 3 marks)

Q7.

(a) When $x = -3$ find the value of

$$x^3 + 2x^2.$$

.....
(1)

(b) Make s the subject of the formula

$$p = st - q.$$

$s =$
(2)

(c) Expand the bracket and simplify the expression

$$7x + 5 - 3(x - 4)$$

.....
(2)

(d) Factorise $e^2 + 4e$

.....
(1)

(e) Solve $7x + 8 = 2x - 3$
Show clear algebraic working.

$x =$
(3)

(f) Expand and simplify $(3y + 10)(y - 2)$

.....
(2)

(g) Factorise $x^2 + 3x - 18$

()()

(2)

(h) Solve $x^2 - 4x - 12 = 0$

Show clear algebraic working.

.....
(3)

(i) Make x the subject of $\frac{5-3x^2}{b} = t$

.....
(2)

Q8. Solve the following simultaneous equation:

$$\begin{aligned} 2x + 3y &= 1 \\ x - 2y &= 4 \end{aligned}$$

$x = \dots\dots\dots$ $y = \dots\dots\dots$

(Total for Question is 4 marks)

Q9.

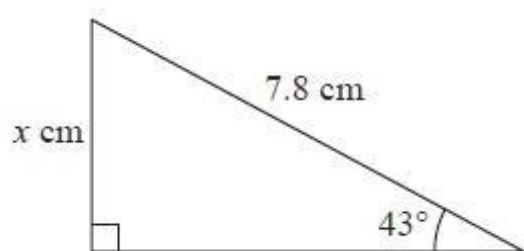


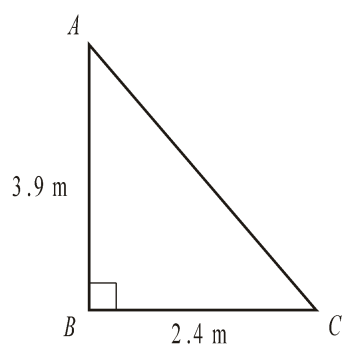
Diagram **NOT**
accurately drawn

Work out the value of x .
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$

(Total for Question is 3 marks)

Q10.



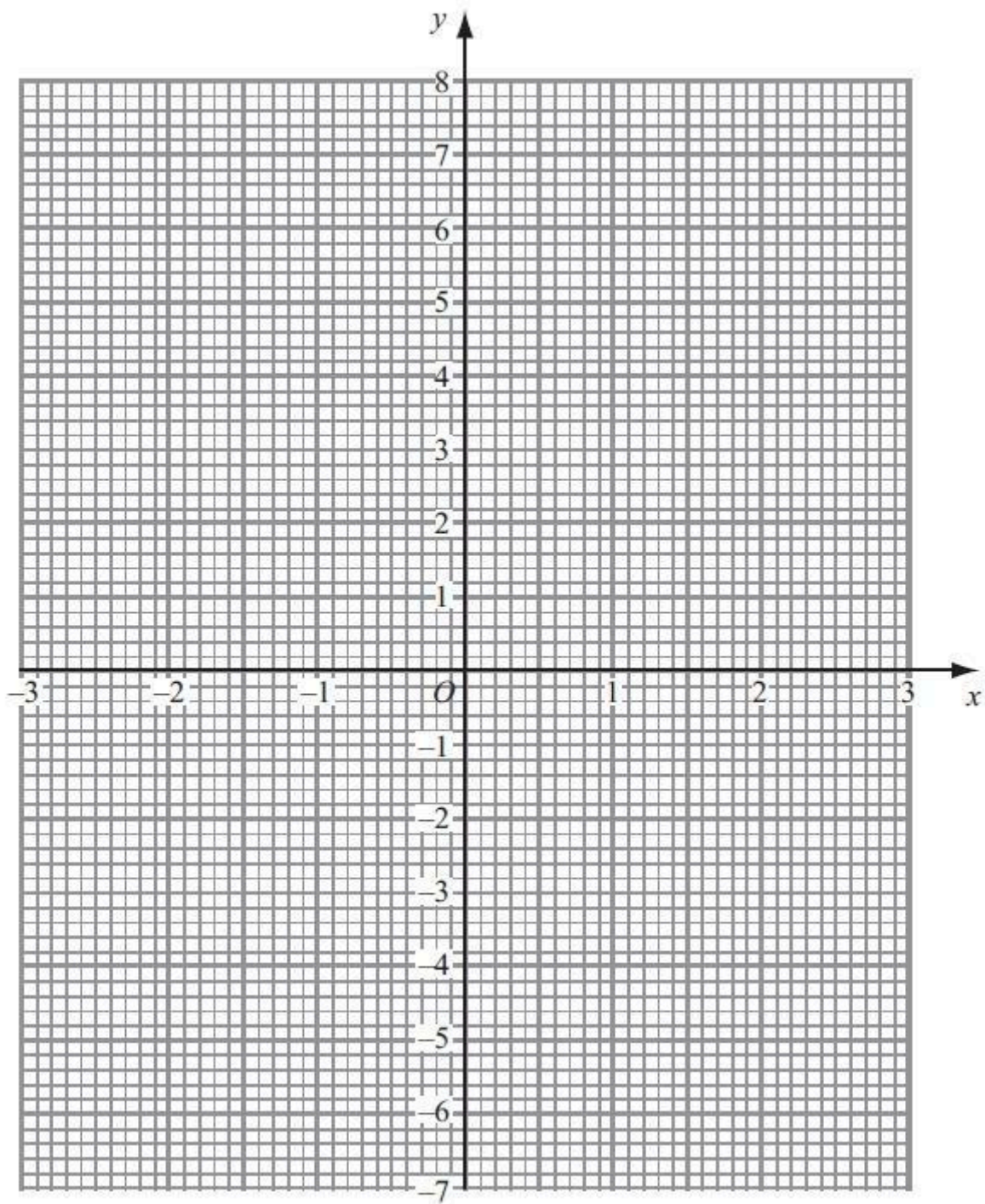
ABC is a right-angled triangle.
 $AB = 3.9 \text{ m}$ and $BC = 2.4 \text{ m}$.
Calculate the length of AC .

$AC = \dots\dots\dots \text{ m}$

(Total for Question is 3 marks)

Q11.

On the grid, draw the graph of $y = 2x - 1$



(Total for question = 4 marks)

Q12.

If 6 hens lay 18 eggs in 4 days, calculate how many eggs 10 hens lay in 8 days.

eggs =

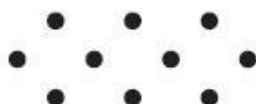
(Total for question = 4 marks)

Q13.

Here are some patterns made from dots.



Pattern number 1



Pattern number 2



Pattern number 3

(a) How many dots are needed for Pattern number 5?

..... (1)

(b) How many dots are needed for Pattern number 20?

..... (2)

(c) Find a formula which shows the relationship between the number of dots n and the pattern number p

$n =$ (2)

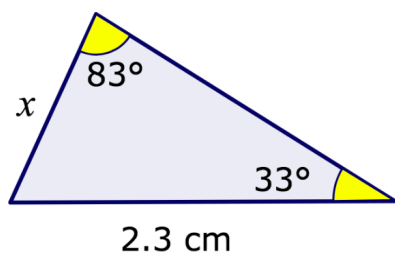
(d) Which is the first pattern which has more than 100 dots?

..... (2)

(Total for question = 7 marks)

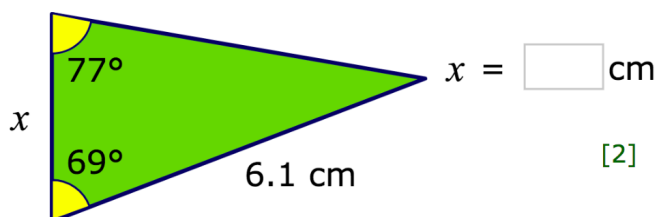
Q14. a)

Find the side x in each question. Give your answer correct to 1 decimal place.



$$x = \boxed{} \text{ cm}$$

[2]



$$x = \boxed{} \text{ cm}$$

[2]

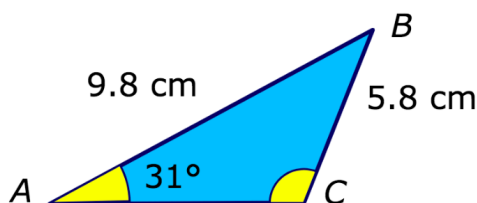
b)

Triangle ABC is such that $AB = 9.8 \text{ cm}$, $BC = 5.8 \text{ cm}$ and angle $BAC = 31^\circ$.

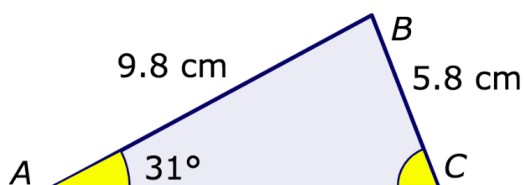
The diagrams show how there can be 2 possible answers for angle ACB .

Work out the values of these 2 answers.

Give your answers correct to the nearest degree.



$$ACB = \boxed{}^\circ \quad [2]$$



$$ACB = \boxed{}^\circ \quad [2]$$