



National 5
Units 1 and 2
Specimen paper (not for assessment)
Prelim Practice Paper

Formulae List

Circumference of a circle: $C = \pi d$

Area of a circle: $A = \pi r^2$

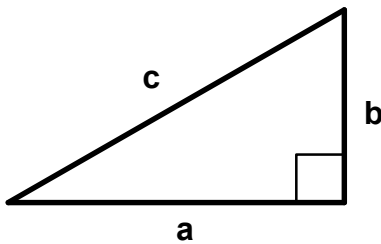
Curved surface area of a cylinder: $V = \pi r^2 h$

Volume of a prism: $V = Ah$

Volume of a cylinder: $\pi r^2 h$

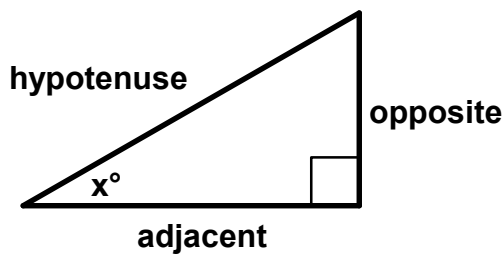
Volume of a cone: $\frac{1}{3}\pi r^2 h$

Theorem of Pythagoras:



$$a^2 + b^2 = c^2$$

Trigonometric ratios
in a right angled triangle:



$$\tan x^\circ = \frac{\textit{opposite}}{\textit{adjacent}}$$

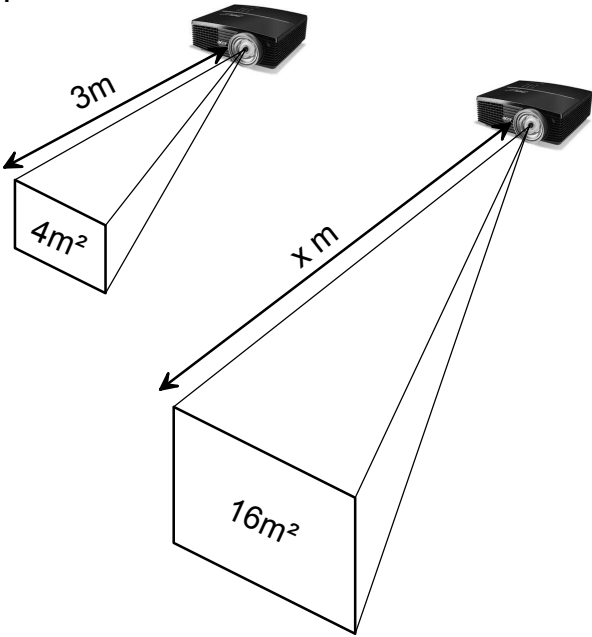
$$\sin x^\circ = \frac{\textit{opposite}}{\textit{hypotenuse}}$$

$$\cos x^\circ = \frac{\textit{adjacent}}{\textit{hypotenuse}}$$

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

1. Evaluate $2\frac{1}{3} + \frac{4}{5}$ of $1\frac{3}{7}$ (3)

2. Remove the brackets and simplify $x^{\frac{2}{3}}(x^{\frac{1}{3}} + 3)$ (2)

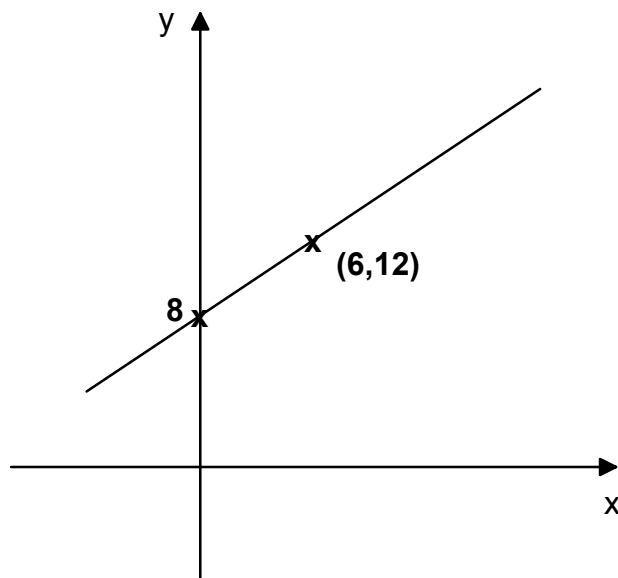
3.  (3)

A projector positioned 3 metres from a screen produces a rectangular image of 4 square metres.

The projector is moved further back, as shown opposite, and the rectangular image now produced is 16 square metres.

Calculate how far the projector is from the image now.
(i.e. the distance x metres in the diagram)

4. Find the equation of the given straight line which passes through the points (0,8) and (6,12).



(3)

5. Solve the equation

$$\frac{3x+1}{2} - \frac{x+4}{3} = 5 \quad \text{where } x \text{ is a real number.} \quad (3)$$

6. Change the subject of the formula $p = q + \sqrt{a}$ to a . (2)

7. Multiply out the brackets and collect the like terms in the expression below.

$$(x+2)(x-5) - 9x \quad (3)$$

8. Express $2\sqrt{5} + \sqrt{20} - \sqrt{45}$ as a surd in its simplest form. (3)

9. Write $y = x^2 - 7x - 3$ in completed square form. (2)

End of paper 1

1. Miss Pitstop has just bought a new car costing £17,500

During the first year, the value of the car is predicted to fall by 14% then by 6½% every successive year thereafter.

How much will the car be worth after 4 years?

Give your answer correct to 2 significant figures.

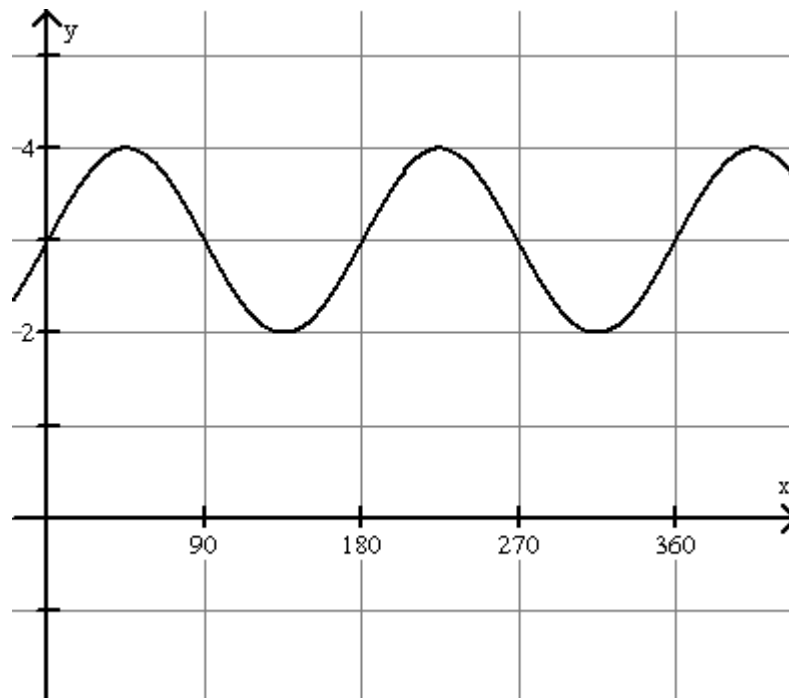
(5)

2. Solve the following equation giving your answers correct to 1 decimal place.

$$3x^2 - 7x - 5 = 0$$

(4)

3. Part of the graph of $y = \sin ax^\circ + b$ is shown below.



Write down the values of a and b .

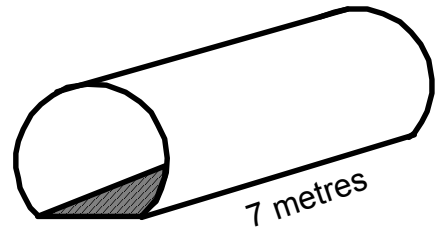
(2)

4. Solve the equation $5 \sin x^\circ + 3 = \sin x^\circ$ for $0 \leq x^\circ \leq 360$

(4)

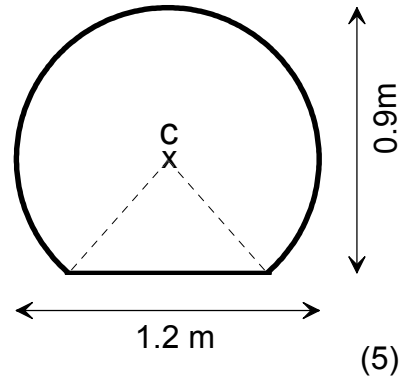
5. Shown is a children's play tunnel which has been fitted with a rectangular insulating mat.

The end of the tunnel consists of part of a circle, centre C, with diameter 1.2 metres.



The height of the tunnel is 0.9 metres.

Calculate the area of the mat if the tunnel is 7 metres long.



(5)

6. The top speed of a space shuttle is 28,000 km/h



It would take the space shuttle $12\frac{1}{2}$ hours to fly from the earth to the moon travelling at top speed.

Find the distance from the earth to the moon giving your answer in **scientific notation**.

(4)

7. Aaron saves 50 pence and 20 pence coins in his piggy bank.

Let x be the number of 50 pence coins in his bank.

Let y be the number of 20 pence coins in his bank.

- a) There are 60 coins in his bank altogether.
Write down an equation in x and y to illustrate this information. (1)
- b) The total value of the coins is £17.40
Write down another equation in x and y to illustrate this information. (1)
- c) Hence find **algebraically**, the number of 50 pence coins Aaron has in his piggy bank. (3)

8. The graph shown has equation $y = x^2 + 3x - 10$.

a) Find the coordinates of A, the point where the curve cuts the y-axis.

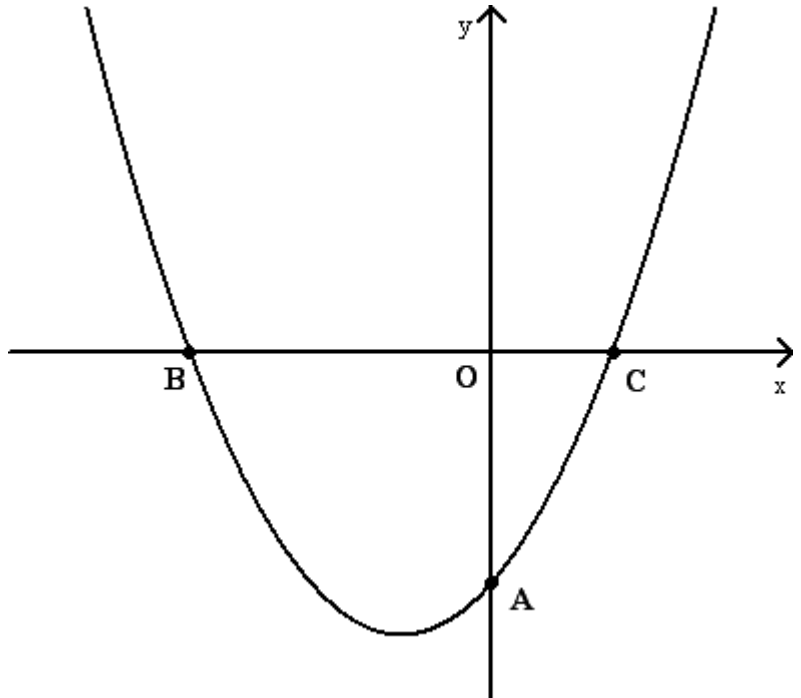
(1)

b) Find the coordinates of B and C, the points where the curve cuts the x-axis.

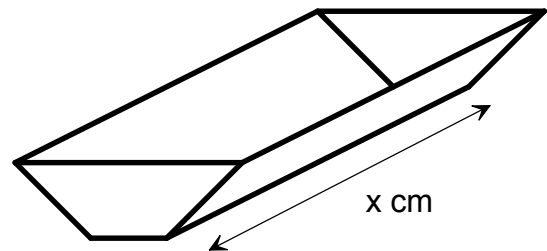
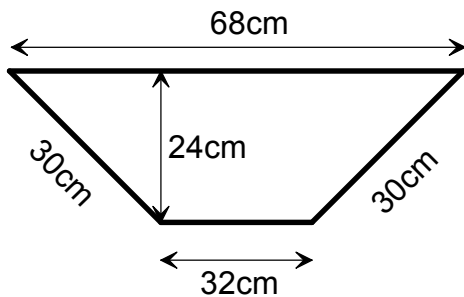
(3)

c) Find the coordinates of the minimum turning point.

(2)



9. A flower planter is in the shape of a prism. The cross-section is a trapezium with dimensions shown.



a) Calculate the area of the cross-section of the planter

(2)

b) The volume of the planter is 156 litres. Calculate the length, x cm, of the planter.

(3)

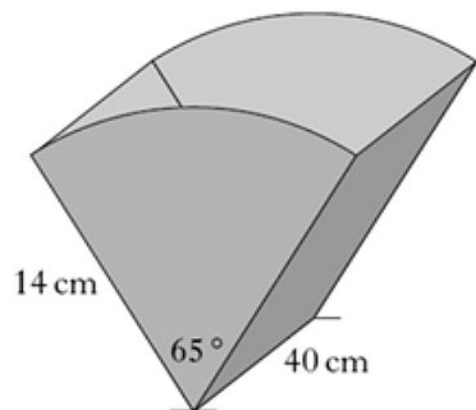
10. The ends of a magazine rack are identical. Each end is a sector of a circle with radius 14 centimetres.

The angle in each sector is 65° .

The sectors are joined by two rectangles, each with length 40 centimetres.

The exterior is covered by material.

What area of material is required?



(4)

End of paper 2