MATHEMATICS ENTRANCE EXAMINATION
ENTRY TO YEAR 10, SAMPLE PAPER

Time Allowed: 60 minutes

Show all steps in any calculation and state the units.
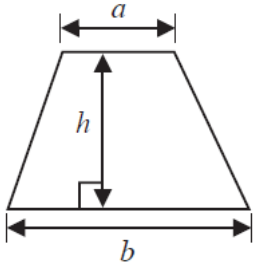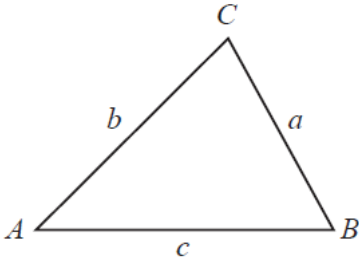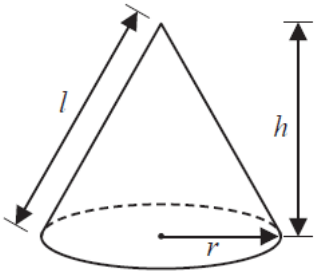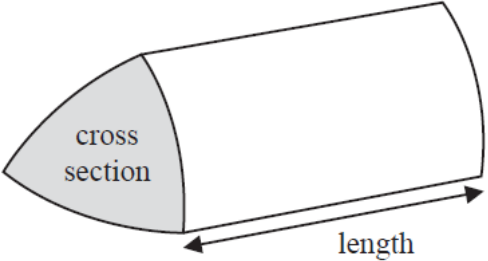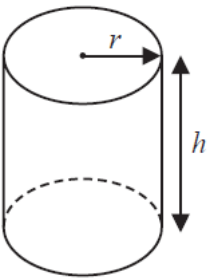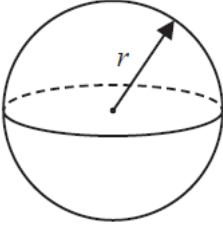
Write your answers in the spaces provided.

Calculators are allowed.

Try to answer all the questions.

Some of the questions may seem unfamiliar. Do not spend too much time on these at first, but move on to questions you like more. You can always return to the unusual ones later.

Your full name:

Your current school:

Arithmetic series

Sum to n terms, $S_n = \dfrac{n}{2}\left[2a + (n-1)d\right]$

The quadratic equation

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

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

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

Trigonometry

In any triangle ABC

Sine Rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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

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

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

Volume of prism
= area of cross section × length

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

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

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

1. (a) Express the following numbers as products of their prime factors.

(i) 60,

....

(ii) 96.

....

(4)

(b) Find the Highest Common Factor of 60 and 96.

....

(1)

(c) Work out the Lowest Common Multiple of 60 and 96.

....

(2)

(Total 7 marks)

2. (a) Simplify $5p + 2q - 3p - 3q$

....
(2)

$$y = 5x - 3$$

(b) Find the value of x when $y = 4$

$x = $ ....
(2)
(Total 4 marks)
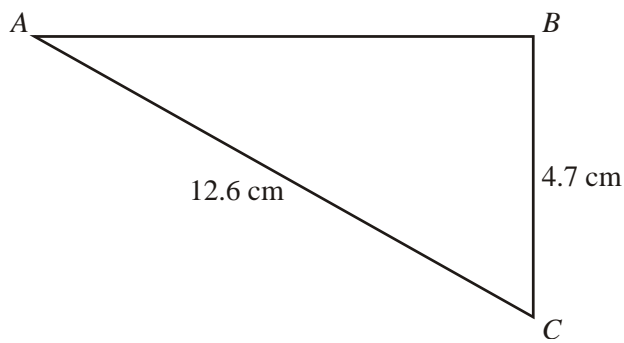
3.

$AC = 12.6$ cm.
$BC = 4.7$ cm.
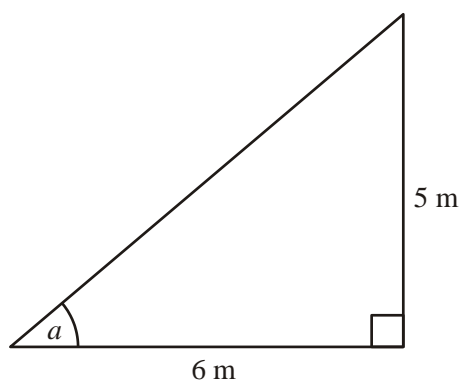Angle $ABC = 90°$.

Calculate the length of AB.
Give your answer correct to 3 significant figures.

………………….. cm
(Total 3 marks)

4. Calculate the size of angle *a* in this right-angled triangle.
Give your answer correct to 3 significant figures.

Diagram **NOT** accurately drawn

5 m

a
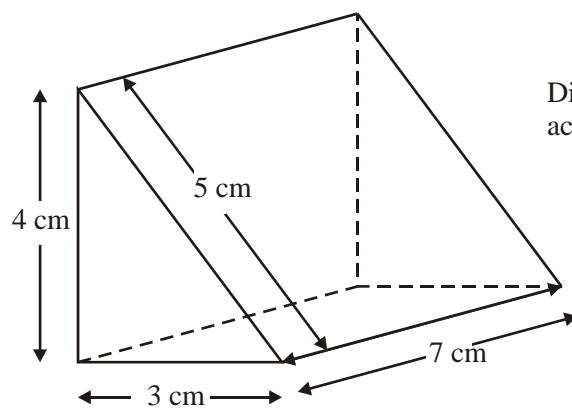
6 m

.....................................°

(3)

5.

Diagram **NOT**
accurately drawn

5 cm

4 cm

3 cm

7 cm

Calculate the volume of the triangular prism.

....
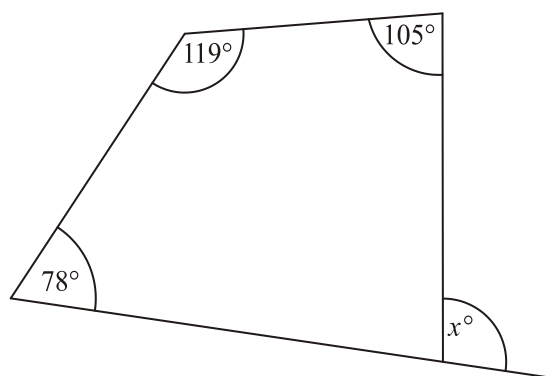
(Total 4 marks)

6.

Diagram **NOT**
accurately drawn

Work out the value of *x*.

x = ………………...

(Total 3 marks)

7. The diagram shows a trapezium of height 3 m.
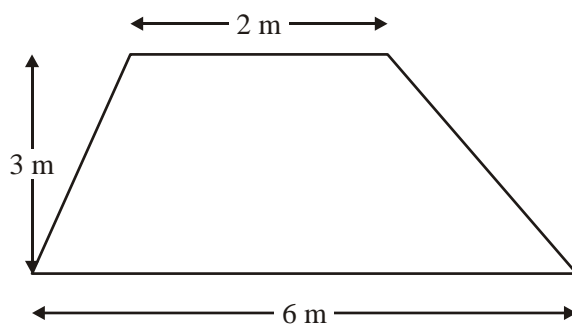
Diagram **NOT**
accurately drawn

Find the area of this trapezium

State the units with our answer.

....

(Total 3 marks)

8. Joe travelled 60 miles in 1 hour 30 minutes.

Work out Joe's average speed.
Give your answer in miles per hour.

.... miles per hour

(Total 2 marks)

9. A 10 pence coin is made from copper and nickel.
The ratio of the weight of copper to the weight of nickel is 18:6
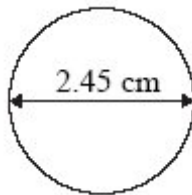
(a) Write the ratio 18:6 in its simplest form

…………………….

(1)

The diameter of the 10 pence coin is 2.45 cm.

(b) Work out the circumference of the coin.
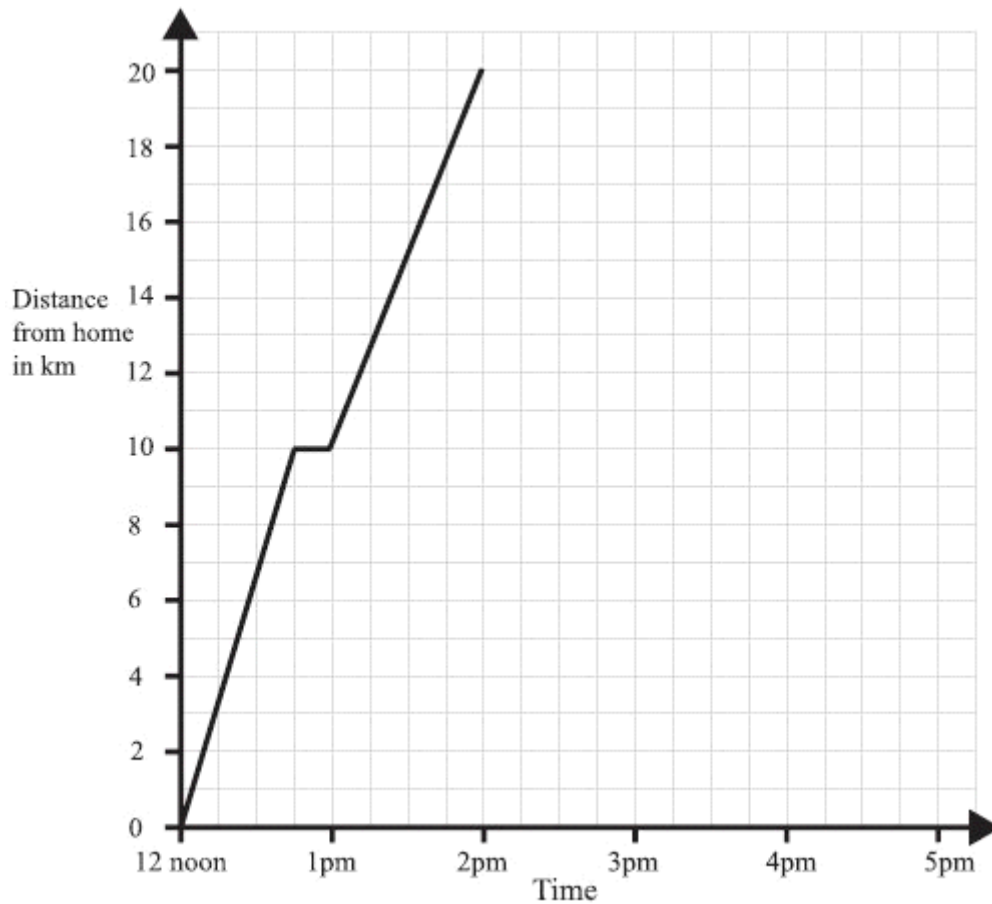Give your answer correct to 1 decimal place.

…………………cm

(2)

(Total 3 marks)

10. A man left home at 12 noon to go for a cycle ride.
The travel graph represents part of the man's journey.

At 12.45pm the man stopped for a rest.

(a)   For how many minutes did he rest?

…………….minutes

(1)

(b)   Find his distance from home at 1.30pm.

………………….km

(1)

The man stopped for another rest at 2pm.

He rested for one hour.

Then he cycled home at a steady speed. It took him 2 hours.

(c)   Complete the travel graph.

(2)
(Total 4 marks)

11. Work out an estimate for the value of $\dfrac{637}{3.2 \times 9.8}$

……………………..
(Total 2 marks)

12. Simplify

(i) $p^2 \times p^7$

……………………

(ii) $x^8 \div x^3$

……………………
(Total 2 marks)

13. Calculate 36% of £4500

£ ………………...
(Total 2 marks)

14. (a) Expand $t(t-2)$

....
(1)

(b) Factorise $3y - 12$

....
(1)
(Total 2 marks)

15. (a) Solve $7x + 18 = 74$

$x = $ ………………………
(2)

(b) Solve $4(2y - 5) = 32$

$y = $ ………………………
(2)

(c) Solve $5p + 7 = 3(4 - p)$

$p = $ ………………………
(3)
(Total 7 marks)

16. Simplify $\dfrac{15a^3 b^7}{3a^2 b^3}$

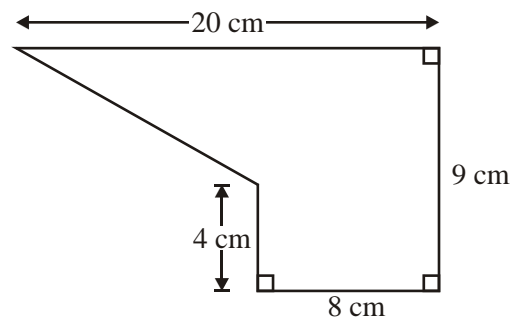…………..……
(Total 2 marks)

17.

Diagram **NOT**
accurately drawn

The diagram shows a shape.
Work out the area of the shape.

…………………………… cm^2
(Total 4 marks)

18.
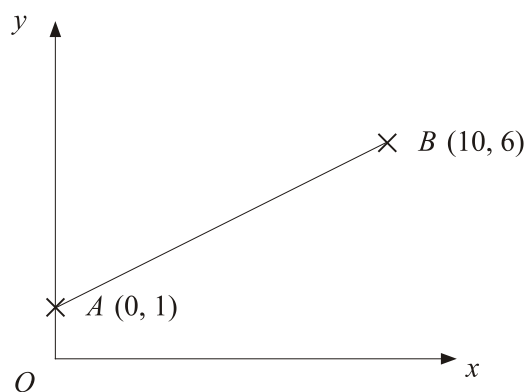

Diagram **NOT** accurately drawn

A is the point (0, 1)
B is the point (10, 6)

(a)   Find the coordinates of the midpoint of *AB*.

(.................. , ...)

(2)

The equation of the straight line through *A* and *B* is $y = \dfrac{1}{2}x + 1$

(b)   Write down the equation of another straight line that is parallel to $y = \dfrac{1}{2}x + 1$

....

(1)

(Total 3 marks)

End of Exam

Total Marks 60