

E Maths Test September

_____ /100 Marks

1. Find the temperature that is 8°C colder than -5°C .

[1]

2. There are two prime numbers in this list.

27 47 57 61 75 93

Find the sum of these two prime numbers.

[2]

3. A train journey starts at 2143. It takes 8 hours and 32 minutes. Find the time the journey finishes.

[1]

4. $v = u - 9.8t$

Find the value of v when $u = 4$ and $t = -7$.

[2]

5. Simplify $d^8 \div d^{-4}$.

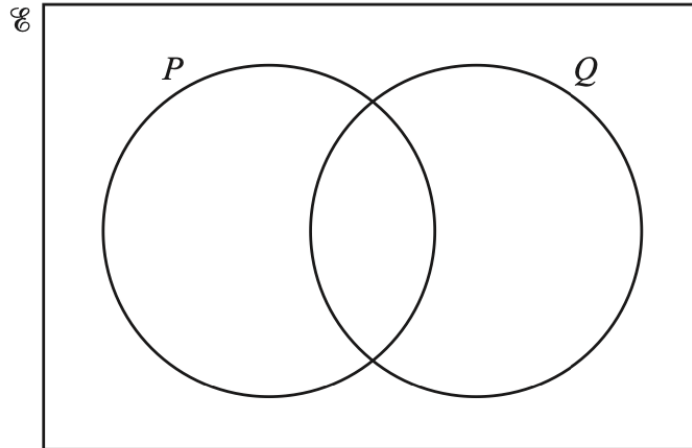
[1]

6.

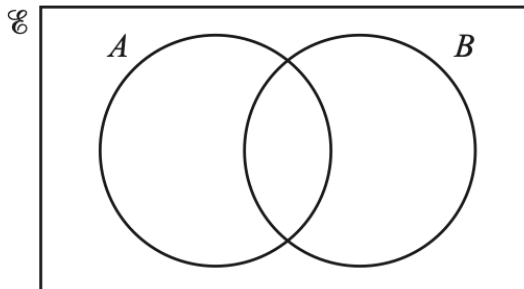
$$\mathcal{E} = \{a, b, e, g, l, m, o, r, t, y\}$$

$$P = \{a, b, e, g, l, r\}$$

$$Q = \{e, g, m, o, r, t, y\}$$



Complete the Venn diagram.



Shade the region $A' \cap B$.

[4]

7. An equilateral triangle has side length 12 cm, correct to the nearest centimetre. Find the lower bound and the upper bound of the perimeter of the triangle.

[2]

8. The volume of a cylinder is 1970 cm^3 . The height of the cylinder is 12.8 cm . Calculate the radius of the cylinder.

[3]

9. Rearrange the formula to make m the subject.

$$R = \frac{2(m-k)}{m}$$

[4]

10. Simplify.

$$\frac{2x^2+5x-12}{4x^2-9}$$

[4]

11. These are the first four terms of a sequence.

2.75 6 11.25 20

The n th term of this sequence is $\frac{1}{4}n^3 + an^2 + bn$.

Calculate the value of a and the value of b .

[5]

12. (a) The price of a house decreased from \$82500 to \$77500.
Calculate the percentage decrease.

[3]

(b) Roland invests \$12 000 in an account that pays compound interest at a rate of 2.2% per year.

Calculate the value of his investment at the end of 6 years. Give your answer correct to the nearest dollar.

[3]

13. (a) Factorise.

i. $2mn + m^2 - 6n - 3m$

[2]

ii. $4y^2 - 81$

[2]

iii. $t^2 - 6t + 8$

[2]

(b) Simplify.

i. $(3p^2)^5$

[2]

ii. $18x^2y^6 \div 2xy^2$

[2]

iii. $(\frac{5}{m})^{-2}$

[1]

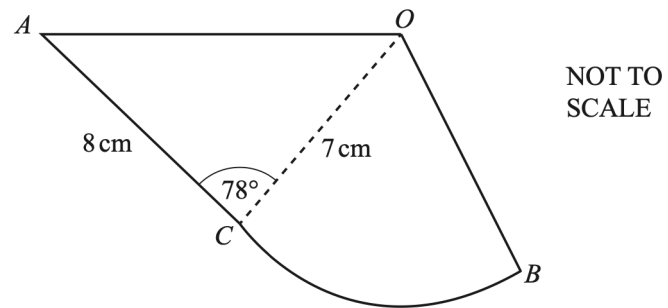
(c) Write 56 as a product of its prime factors.

[2]

(d) Find the lowest common multiple (LCM) of 56 and 42.

[2]

14.



The diagram shows a design made from a triangle AOC joined to a sector OCB . $AC = 8$ cm, $OB = OC = 7$ cm and angle $ACO = 78^\circ$.

- a. Use the cosine rule to show that $OA = 9.47$ cm, correct to 2 decimal places.

[4]

- b. Calculate angle OAC .

[3]

c. The perimeter of the design is 29.5 cm.

Show that angle $COB = 41.2^\circ$, correct to 1 decimal place.

[5]

d. Calculate the total area of the design.

[4]

15. In a regular polygon, the interior angle is 11 times the exterior angle.

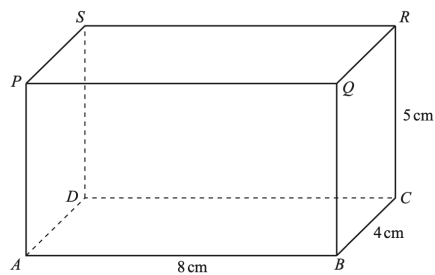
a. Work out the number of sides of this polygon.

[3]

b. Find the sum of the interior angles of this polygon.

[2]

16.



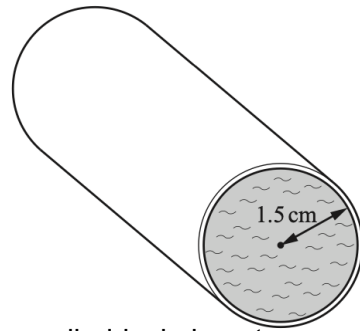
NOT TO
SCALE

The diagram shows a cuboid.

$AB = 8$ cm, $BC = 4$ cm and $CR = 5$ cm. Calculate the angle between the diagonal AR and the plane $BCRQ$.

[4]

17. (a)



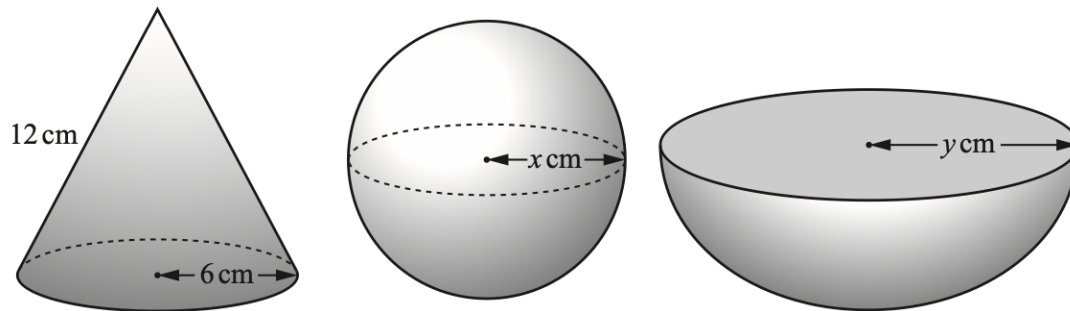
NOT TO
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Water flows through a cylindrical pipe at a speed of 8 cm/s.
The radius of the circular cross-section is 1.5 cm and the pipe is always completely full of water.

Calculate the amount of water that flows through the pipe in 1 hour. Give your answer in litres.

[4]

(b)



NOT TO
SCALE

The diagram shows three solids.

The base radius of the cone is 6 cm and the slant height is 12 cm.

The radius of the sphere is x cm and the radius of the hemisphere is y cm. The **total** surface area of each solid is the same.

i. Show that the total surface area of the cone is $108\pi\text{cm}^2$.

[The curved surface area, A , of a cone with radius r and slant height l is $A = \pi rl$.]

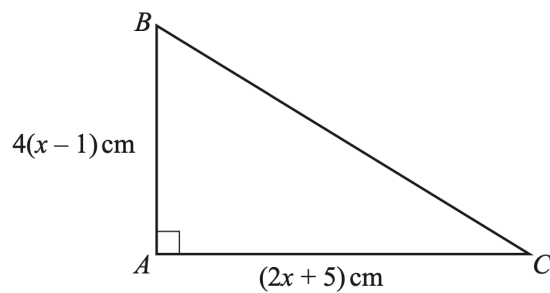
[2]

ii. Find the value of x and the value of y .

[The surface area, A , of a sphere with radius r is $A = 4\pi r^2$.]

[4]

18. The diagram shows a right-angled triangle ABC .



NOT TO
SCALE

The area of this triangle is 30 cm^2 .

(a) Show that $2x^2 + 3x - 20 = 0$.

[3]

(b) Use factorisation to solve the equation $2x^2 + 3x - 20 = 0$.

[3]

(c) Calculate BC .

[3]

19. Use the quadratic formula to solve the equation $3x^2 + 7x - 11 = 0$.
You must show all your working and give your answers correct to 2 decimal places.

[4]

20. Without using a calculator, work out $\frac{1}{15} + \frac{2}{5}$.

Write down all the steps of your working and give your answer as a fraction in its simplest form.

[2]