E Maths August Test

/70marks

1. Write down a prime number between 20 and 30.

[1]

2. Write 0.000 038 7 in standard form.

[1]

3. Write the recurring decimal 0.63 as a fraction.

[2]

4. One morning, Marcia works from 08 20 to 11 15.
   Find how long she works for.
   Give your answer in hours and minutes.

[2]

5. One day in Chamonix the temperature at noon was 6 °C.
   At midnight the temperature was 11 °C lower. Write down the temperature at midnight.

[1]

6. Liz takes 65 seconds to run 400 m.
   Calculate her average speed.

[1]

7. Increase \$22 by 15%.

[2]

8. Solve.

$\frac{1-p}{3} = 4$

[2]

9. Factorise completely.

$2a + 4b - ax - 2bx$

[2]

10. $A = (2\pi + y)x^2$

Rearrange the formula to make x the subject.

[2]

11. Simplify.

$$\frac{3+x}{9-x^2}$$

[2]

12. **Without using your calculator**, work out $1\frac{3}{4} \times \frac{6}{35}$.

You must show all your working and give your answer as a fraction in its simplest form.

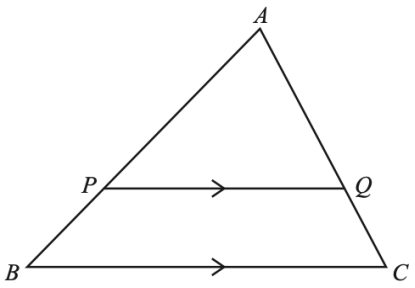
[3]

13. The line *PQ* has equation $y = 3x - 8$ and point *P* has coordinates (6, 10).

Find the equation of the line that passes through *P* and is perpendicular to *PQ*. Give your answer in the form $y = mx + c$.

[4]

14.

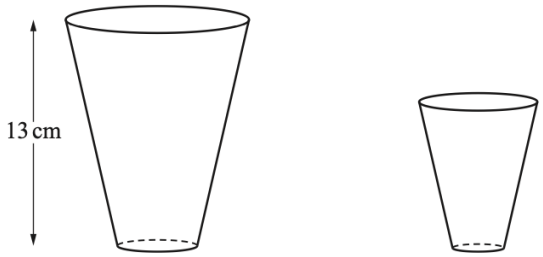


NOT TO SCALE

In the diagram, *PQ* is parallel to *BC*. *APB* and *AQC* are straight lines.
PQ = 8 cm, *BC* = 10 cm and *AB* = 9 cm.

Calculate *PB*.

[2]



NOT TO SCALE

The diagram shows two glasses which are mathematically similar.
The larger glass has a capacity of 0.5 litres and the smaller glass has a capacity of 0.25 litres.
The height of the larger glass is 13 cm.

Calculate the height of the smaller glass.

[3]

15. $2^p = \frac{1}{8^4}$

Find the value of p.

[2]

16. Solve the simultaneous equations.

You must show all your working.

$$2x + 0.5y = 13$$

$$3x + 2y = 17$$

[3]

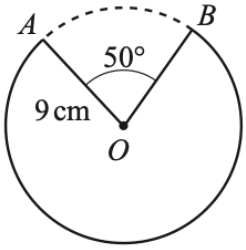
17. A regular pentagon has an exterior angle, d.

A regular hexagon has an interior angle, h.

Find the fraction $\frac{d}{h}$.
Give your answer in its simplest form.

[4]

18.



NOT TO SCALE

The diagram shows a circle of radius 9 cm, centre O.

The minor sector AOB, with sector angle 50°, is removed from the circle.
Calculate the length of the major arc AB.

[3]

19. (a) Anil changes $830 into euros when the exchange rate is 1 euro = $1.16 .
He spends 500 euros.
He then changes the remaining money back into dollars at the same exchange rate.

Work out how much, in dollars, Anil receives.

[3]

(b) In 2021, Anil earns $37 000.

(i) He spends $12 400 on bills in 2021.
Calculate the percentage of his earnings he spends on bills.

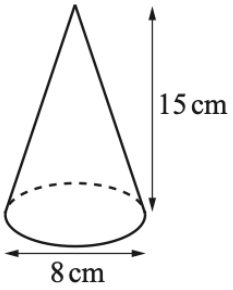
[2]

(ii) His earnings of $37 000 increase by 3.2% in 2022.

Calculate his earnings in 2022.

[2]

20. (a)



NOT TO SCALE

A cone has base diameter 8 cm and perpendicular height 15 cm.

(i) Calculate the volume of the cone.

[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$]

[2]

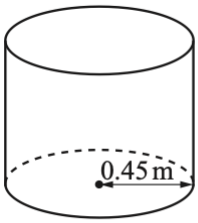
(ii) A label completely covers the curved surface area of the cone.

Calculate the area of the label as a percentage of the **total** surface area of the cone.

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

[5]

(b)



NOT TO SCALE

An empty cylindrical container has radius 0.45 m.
300 litres of water is poured into the container at a rate of 375 ml per second.

(i) Find the time taken, in minutes and seconds, for all the water to be poured into the container.

[3]

(ii) Calculate the height of the water in the container.

[3]

21. (a) A sequence has *n*th term $\frac{n}{2n+3}$.

(i). Find the first three terms of this sequence.

Give your answers as fractions.

[2]

(ii). The *k*th term of this sequence is $\frac{12}{25}$.

Find the value of *k*.

[2]

(b) Find the *n*th term of each sequence.

(i) $6, \quad 13, \quad 32, \quad 69, \quad 130, \ldots..$

[2]

(ii) $100, \quad 50, \quad 25, \quad 12.5, \quad 6.25, \ldots...$

[2]