



Mathematics
Practice Exam
2024

Mark

Essential Skills (1 hour)

**Mathematics
Paper 1 (Non-calculator)**

Total marks – 40

Attempt ALL questions.

You may NOT use a calculator.

To earn full marks, you must show your working in your answers.

State the units for your answer where appropriate.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting.

Use blue or black ink.

FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

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

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

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

Volume of a pyramid $V = \frac{1}{3}Ah$

Standard deviation: $s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$

or $s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n - 1}}$, where n is the sample size.

Total marks – 40
Attempt ALL questions

MARKS

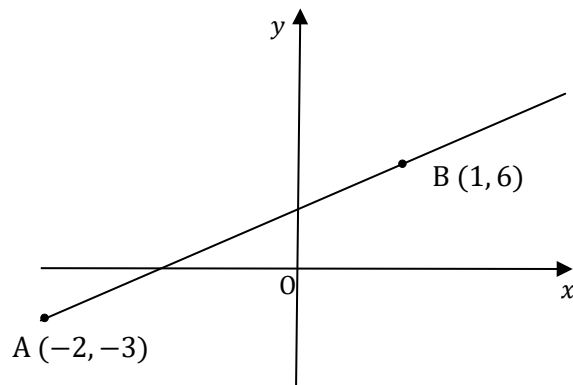
DO NOT
WRITE IN
THIS
MARGIN

1. Evaluate $2\frac{1}{5} \times 1\frac{7}{8}$.

2

2. Find the equation of the line shown.

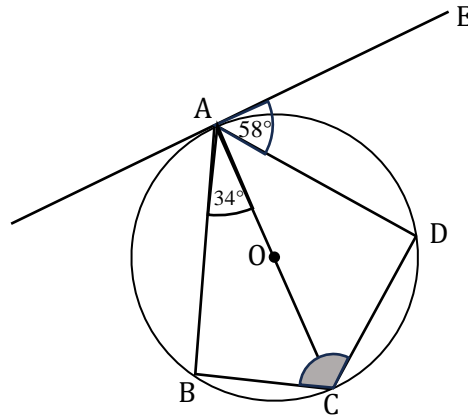
3



3. Change the subject of the formula $d = \frac{4p^2}{5}$ to p .

3

4. The diagram shows a circle, centre O .



Angle BAC is 34° .

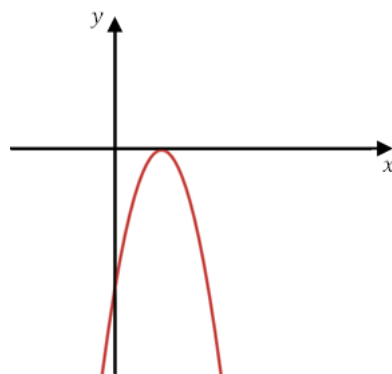
Angle DAE is 58° .

AE is a tangent.

Calculate the size of angle BCD .

3

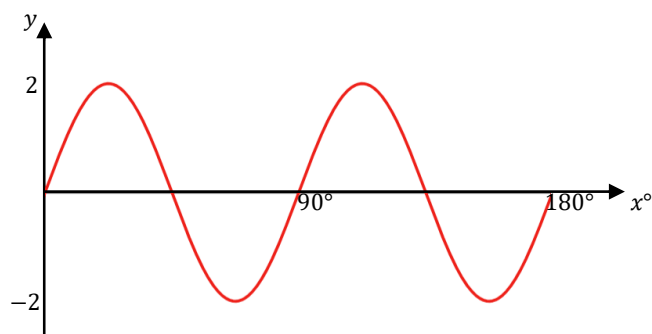
5. The graphs a function of the form $y = ax^2 + bx + c$.



Write down the value of $b^2 - 4ac$.

1

6. Part of the graph of $y = a \sin bx$ is shown below.



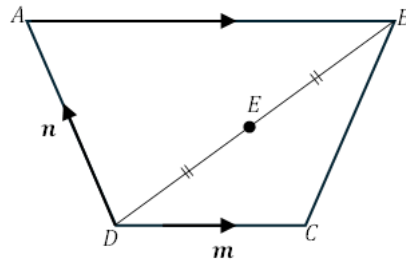
Write down the values of a and b .

2

7. The monthly energy bill for an average 2-bedroom house dropped by 20% to £176. What was the monthly bill before the drop?

3

8. In the diagram \overrightarrow{DC} and \overrightarrow{DA} represent the vectors \mathbf{m} and \mathbf{n} respectively.



- $\overrightarrow{AB} = 2\overrightarrow{DC}$
- $\overrightarrow{DE} = \overrightarrow{EB}$

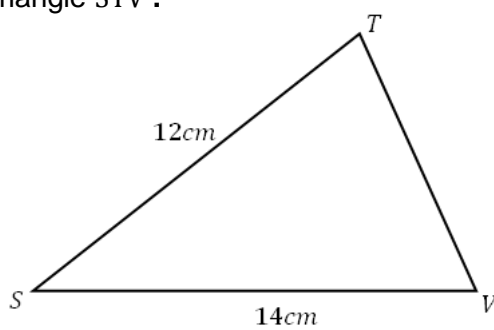
- (a) Express \overrightarrow{DB} in terms of \mathbf{m} and \mathbf{n} . 1
- (b) Hence, express \overrightarrow{BE} in terms of \mathbf{m} and \mathbf{n} 2

9. Simplify

$$(2d^{-2})^3$$

Give your answer with a **positive** power. 2

10. The diagram show triangle STV .



- $ST = 12$ centimetres
- $SV = 14$ centimetres
- $\sin S = \frac{3}{4}$

Calculate the area of STV.

3

11. A function $f(x)$ is defined by $f(x) = 7x - 2$.

(a) Evaluate $f(-1)$.

1

(b) $f(p) = -30$

Calculate the value of p .

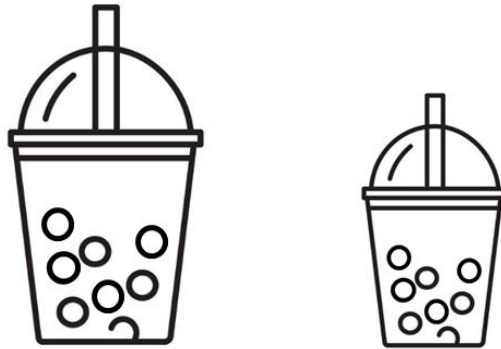
2

12. Solve the inequation

$$\frac{x + 4}{3} \leq \frac{2x - 5}{2}$$

3

13. Bubble tea is sold in small and large cups.
The cups are mathematically similar in shape.



- The large cup has a volume of 540 millilitres and is 12cm high.
The small cup holds 160 millilitres.
Calculate the height of the small cup.

3

14. (a) Express $x^2 - 4x - 1$ in the form $(x + p)^2 + q$

2

(b) The roots of the equation $x^2 - 4x - 1 = 0$ can be expressed in the form $x = a \pm \sqrt{b}$.

Find, algebraically, the value of a and b .

4

[END OF QUESTION PAPER]