



Practice Paper E

Paper 2 – Calculator

Total Marks – 60

Attempt ALL questions.

**You may use a calculator.**

Full credit will only be given to solutions which contain appropriate working.

State the units for your answers where appropriate

Write your answers clearly in the space provided in this booklet.

## 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.

1. The speed of light is approximately  $3 \times 10^8$  metres per second. 2

The distance between Earth and the Sun is  $1.5 \times 10^8$  kilometres.

How long, in seconds, will it take from light to travel from the Sun to Earth.

2. a. Factorise 2

$$x^2 - x - 20$$

- b. Hence simplify 2

$$\frac{x^2 - x - 20}{3x^2 - 75}$$

3. A straight line has the equation

$$3x + 5y - 15 = 0$$

a. State the  $y$ -intercept and gradient of the line.

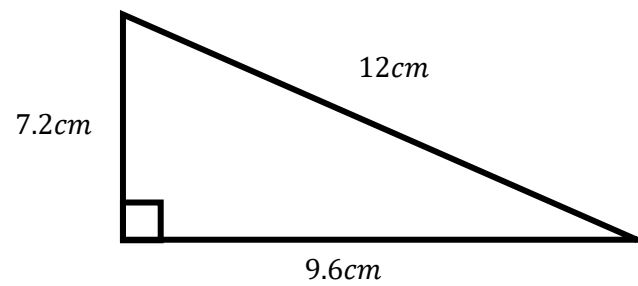
2

b. Find the coordinate where the line crosses the  $x$  axis.

1

4. Prove the following triangle is a right-angle triangle.

3



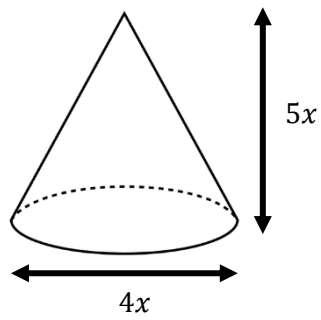
5. Evaluate

2

$$\left| \begin{pmatrix} 2 \\ 5 \\ -3 \end{pmatrix} \right|$$

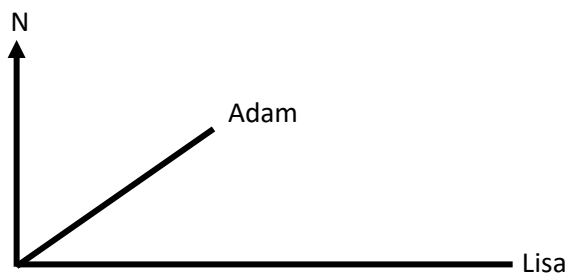
6. Find the value of  $x$  where this cone has a volume of  $108\text{cm}^3$

3



7. Adam runs  $12\text{km}$  on a bearing of  $40^\circ$

Lisa runs east on for  $25\text{km}$ .



How far apart are Adam and Lisa at the end of their run.

4

8. Martin recorded his last five rounds of golf below

86, 94, 82, 85, 91

a. Calculate his mean score. 1

b. Calculate the standard deviation. 3

After a block of train sessions he recorded his next 5 rounds.

His mean score is now 79 and the standard deviation is 9.3.

c. Write two statements comparing his scores before and after the training. 2

9. Solve

3

$$2 \tan x - 3 = 2$$

Where  $0 \leq x \leq 360^\circ$



10. Change the subject of the formula to  $p$ .

3

$$m = \sqrt{n - 3p}$$

11. A van depreciates at a rate of 18% per annum.

a. How long will 60% of its original value.

3

b. What will the value of a van priced at £20,000 be at this time.

2

Give your answer to the nearest hundred.

12. Shape A and Shape B are mathematically similar.

3

Shape A has a length of  $7\text{cm}$  and an area of  $27\text{cm}^2$

Shape B has an area of  $135\text{cm}^2$ .

Find the length of shape B.

13. Solve

$$2x^2 + 10x + 9 = 0$$

3

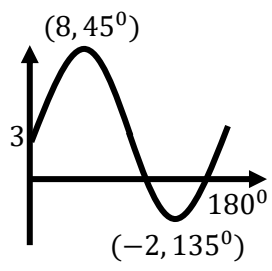
Give your answer to 2 significant figures.

14. Solve

$$\frac{3x + 5}{5x + 4} < \frac{4}{3}$$

3

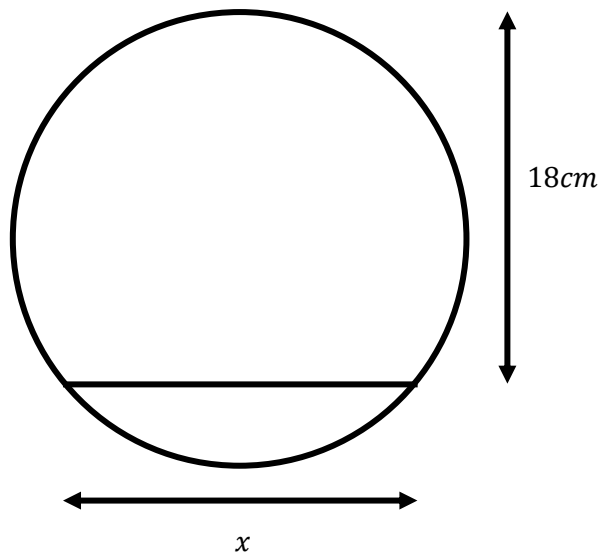
15. The graph shows  $y = a \sin bx + c$



State the values of  $a$ ,  $b$  and  $c$ .

3

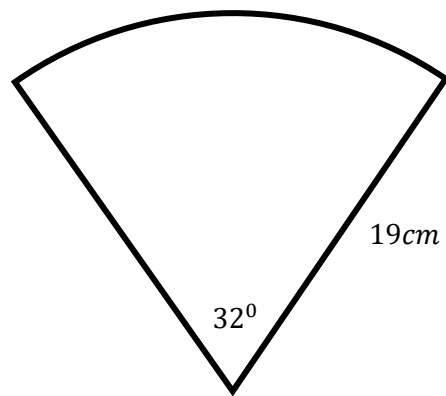
16. The circle has a radius of  $11\text{ cm}$ .



Find the length of the chord  $x$ .

17. Find the area of the sector

3



18. Write

3

$$\frac{3}{x} + \frac{7}{2x + 3}, \quad x \neq 0, x \neq -1.5$$

as a single fraction.

**END OF PAPER**

