N5 Mathematics Practice Exam 2023

Mark

Mathematics
Essential Skills (1 hour) 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 $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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

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

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

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

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

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

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

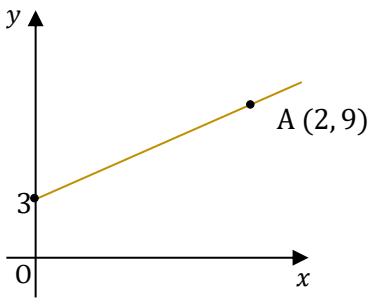
or $s = \sqrt{\dfrac{\sum x^2 - \dfrac{(\sum x)^2}{n}}{n - 1}}$, where n is the sample size.

MARKS | DO NOT WRITE IN THIS MARGIN

Total marks – 40
Attempt ALL questions

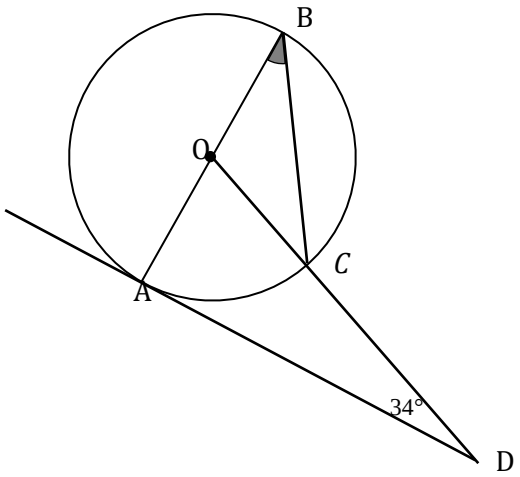
1. Evaluate $3\frac{4}{5} \div \frac{7}{10}$ **2**

2. Find the equation of the line shown, in the form $y = mx + c$ **2**



3. Determine the nature of the roots of the function $f(x) = x^2 + 2x + 5$. **2**

4. The diagram shows a circle, centre O.



Angle ADC is 34°.

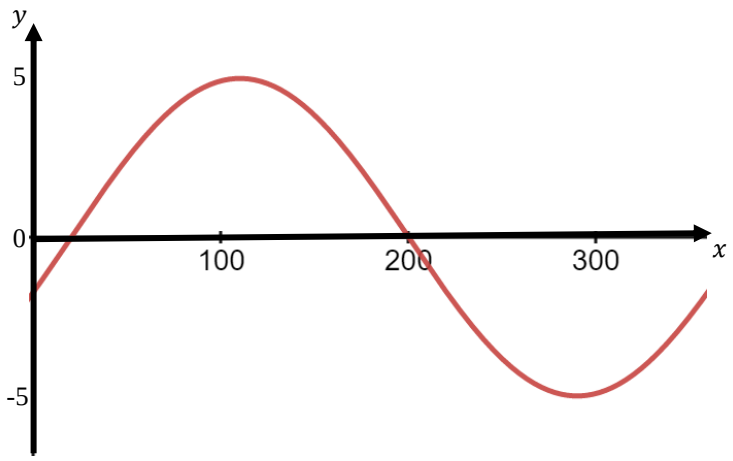
AD is a tangent.

Calculate the size of angle OBC. **3**

5. (a) Express $x^2 - 8x + 1$ in the form $(x + a)^2 + b$. **2**

(b) Hence, state the equation of the axis of symmetry of $y = x^2 - 8x + 1$ **1**

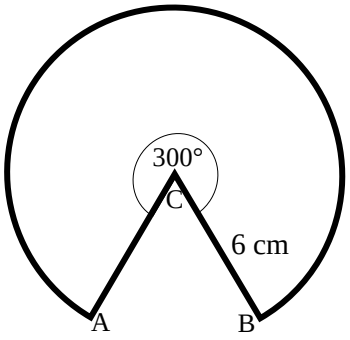
6. The graph of $y = a\sin(x + b)°$, $0 \leq x \leq 360$, is shown below.



Write down the values of a and b. **2**

7. A political candidate won a constituency election.
They received 16400 votes, which represented 40% of all voters.
How many people voted altogether? **3**

8. The diagram shows a sector of a circle, centre C.



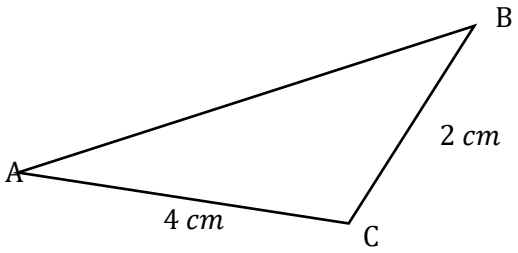
The radius of the circle is 6 centimetres and angle ACB is 300°.
Calculate the area of the sector.
Take $\pi = 3 \cdot 14$. **3**

9. Express

$$3x^{\frac{1}{2}}(2x^{-\frac{1}{2}} - x)$$

In its simplest form. **2**

10. The diagram show triangle ABC **.**



- $\mathrm{BC} = 2$ centimetres
- $\mathrm{AC} = 4$ centimetres
- $\cos \mathrm{C} = -\frac{1}{2}$

Calculate the length of AB, **leaving you answer as a simplified surd**. **3**

11. A function $f(x)$ is defined by $f(x) = \frac{5}{\sqrt{x}}$, $x > 0$.

Express $f(6)$ as a fraction with a rational denominator. **2**

12. Solve the equation

$$\frac{x}{4} - \frac{x+2}{5} = 1$$

3

13. A straight line has equation $4x + 5y - 20 = 0$.

(a) Find the gradient of the line **2**

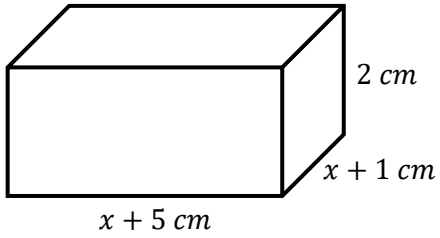
(b) State the coordinates of the point where the line crosses the y-axis. **1**

14. The mean weight of crisps in a packet from an older production machine was 32·5 grams, with a standard deviation of 2·3 grams.

A new production machine has a mean of 31·9 grams and standard deviation of 1·1 grams.

Make **two** valid comparisons between the production machines. **2**

15. A cuboid is shown below.



It has length $x + 5$ centimetres, breadth $x + 1$ centimetres, height 2 centimetres and a volume of 64cm³.

(a) Show that

$$x^2 + 6x - 27 = 0$$ **2**

(b) Calculate the value of x and state the length of the box. **3**

[END OF QUESTION PAPER]