



Mathematics

National 5 Practice Paper B

Paper 1

Duration - 1 hour

Total marks - 40

- You may NOT use a calculator
- Attempt all the questions.
- Use **blue** or **black** ink.
- Full credit will only be given to solutions which contain appropriate working.
- State the units for your answer where appropriate.

FORMULAE LIST

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

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

1. Evaluate

$$7.18 - 2.1 \times 3.$$

2

2. Evaluate

$$1\frac{1}{8} \div \frac{3}{4}$$

2

3. Solve the inequality $5 - x > 2(x + 1)$

3

4. Given that $f(x) = x^2 + 5x$, evaluate $f(-3)$.

2

5. Vector \mathbf{u} has components $\begin{pmatrix} 3 \\ -2 \\ -1 \end{pmatrix}$ and vector \mathbf{v} has components $\begin{pmatrix} 2 \\ -4 \\ 1 \end{pmatrix}$.

Calculate $|4\mathbf{u} - 2\mathbf{v}|$.

2

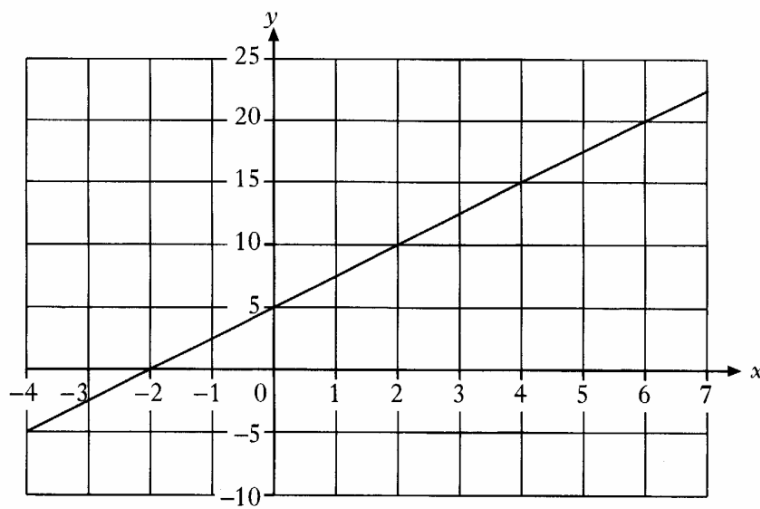
6. (a) Factorise $p^2 - 4q^2$.

1

(b) Hence simplify $\frac{p^2 - 4q^2}{3p + 6q}$.

2

7.

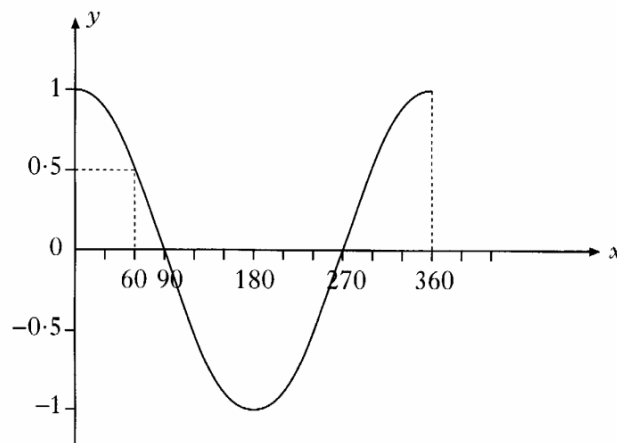


Find the equation of the straight line shown in the diagram.

Give your answer in the form $y = mx + c$.

3

8.



Part of the graph of $y = \cos x^\circ$ is shown above.

If $\cos 60^\circ = 0.5$, state two values for x for which $\cos x^\circ = -0.5$, $0 \leq x \leq 360$.

2

9. Multiply out the brackets and collect like terms.

$$(x - 3)(x^2 + 4x - 1)$$

3

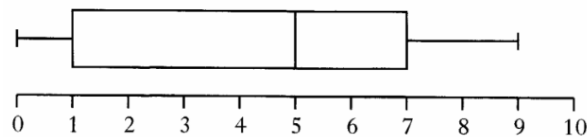
10. A sample of students was asked how many times each had visited the cinema in the last three months.

The results are shown below.

4 5 4 1 4 3 2 2 4 6 2
3 4 4 1 3 1 2 3 1 1

- (a) From the above data, find the median, the lower quartile and the upper quartile. 3
- (b) Construct a boxplot for the data. 2
- (c) The same sample of students was asked how many times each had attended a football match in the same three months.

The boxplot below was drawn for this data.



- Compare the two boxplots and comment. 1

11. Two functions are given below.

$$f(x) = x^2 + 2x - 1$$

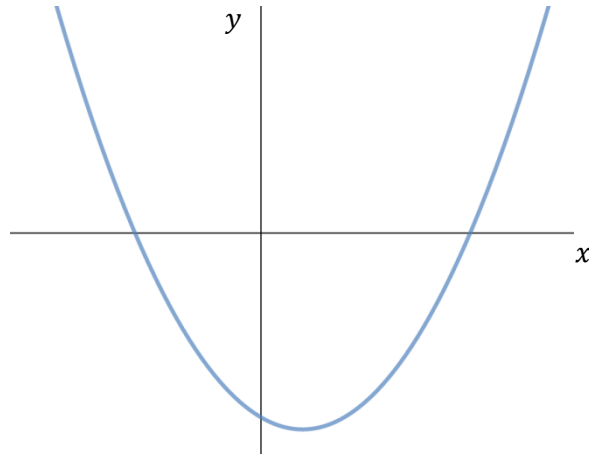
$$g(x) = 5x + 3$$

- Find the values of x for which $f(x) = g(x)$. 3

12. Express in its simplest form

$$y^8 \times (y^3)^{-2} \quad \text{2}$$

13.



The equation of the parabola in the above diagram is

$$y = (x - 1)^2 - 16.$$

- (a) State the coordinates of the minimum turning point of the parabola. 2
- (b) State the equation of the axis of symmetry of the parabola. 1

14. (a) Express $\sqrt{45} - 2\sqrt{5}$ as a surd in its simplest form. 2
- (b) Express as a fraction in its simplest form

$$\frac{1}{x^2} + \frac{1}{x}, \quad x \neq 0 \quad 2$$

[End of question paper]