N5

Mαthematics

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 $ax^2 + bx + c = 0 \quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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

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

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: $s = \sqrt{\dfrac{\sum(x-\bar{x})^2}{n-1}} = \sqrt{\dfrac{\sum x^2 - (\sum x)^2/n}{n-1}}$, 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 $\boldsymbol{u}$ has components $\begin{pmatrix} 3 \\ -2 \\ -1 \end{pmatrix}$ and vector $\boldsymbol{v}$ has components $\begin{pmatrix} 2 \\ -4 \\ 1 \end{pmatrix}$.

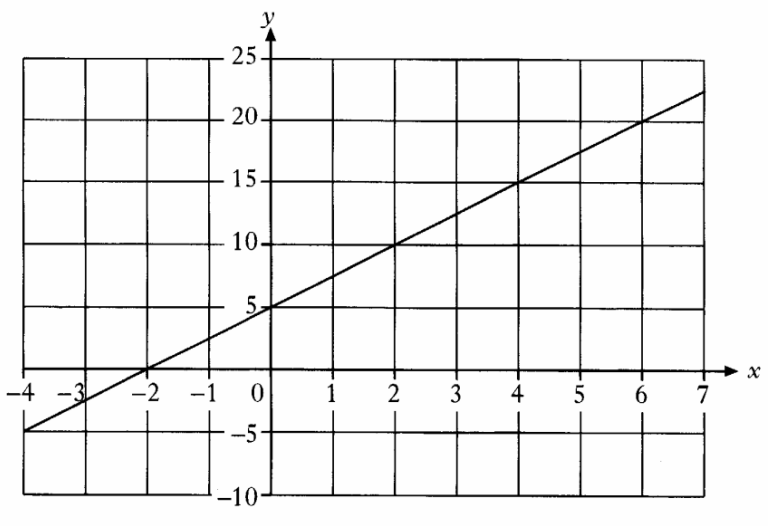
Calculate $|4\boldsymbol{u} - 2\boldsymbol{v}|$. 2

6. (a) Factorise $p^2 - 4q^2$. 1

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

2

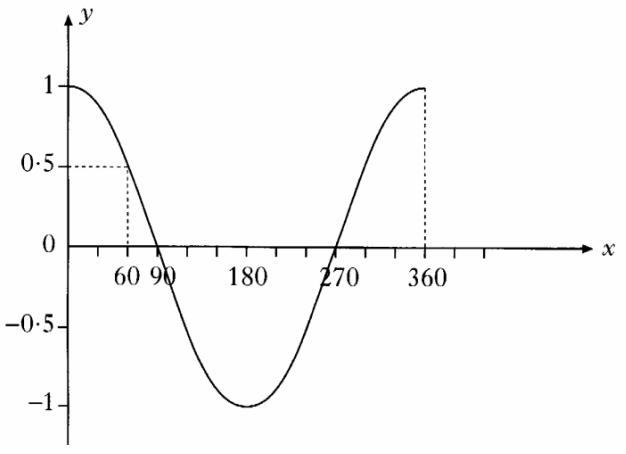
7.



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 $y = \cos x°$ is shown above.

If $\cos 60° = 0.5$, state two values for x for which $\cos x° = -0.5$, $0 \leq x \leq 360$. 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) Calculate the semi-interquartile range. 1

(c) The same sample of students was asked how many times each had attended a football match in the same three months.

The data had a median of 5 and a semi-interquartile range of 3.

Make two appropriate comments comparing students visiting the cinema and students attending a football match. 2

11. Two functions are given below.

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

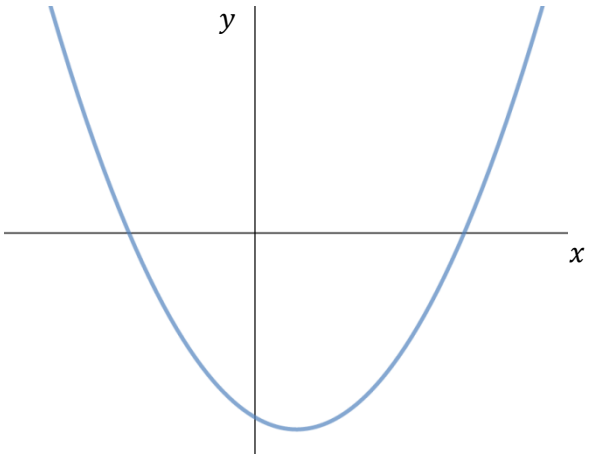
$$g(x) = 5x + 3$$

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

12. Express in its simplest form

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

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

[End of question paper]