N5

Mathematics

National 5 Practice Paper F

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

$$1\frac{3}{5} + 2\frac{4}{7}.$$

2

2. (a) Factorise

$$4x^2 - y^2.$$

1

(b) Hence simplify

$$\frac{4x^2 - y^2}{6x + 3y}.$$

2

3. A group of people attended a course to help them stop smoking.

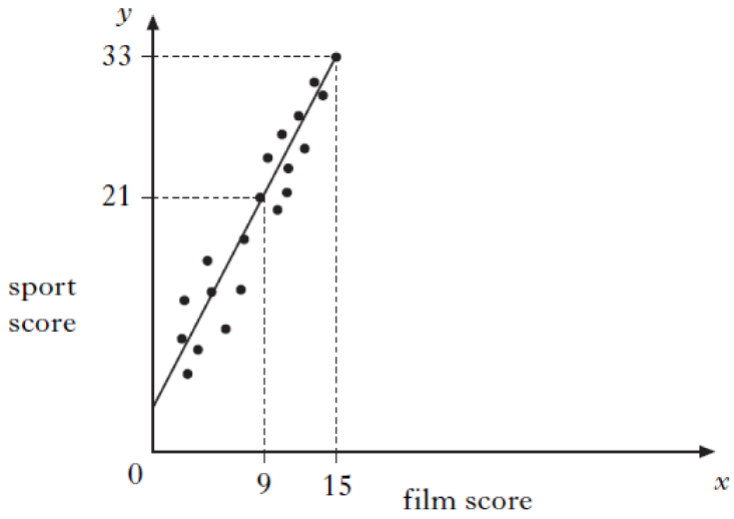
The following table shows the statistics before and after the course.

	Mean number of cigarettes smoked per person per day	Standard deviation
Before	20.8	8.5
After	9.6	12.0

Make **two** valid comments about these results. 2

4. Teams in a quiz answer questions on film and sport.

This scatter graph shows the scores of some of the teams.



A line of best fit is drawn as shown above.

(a) Find the equation of this straight line. 3

(b) Use this equation to estimate the sport score for a team with a film score of 20. 1

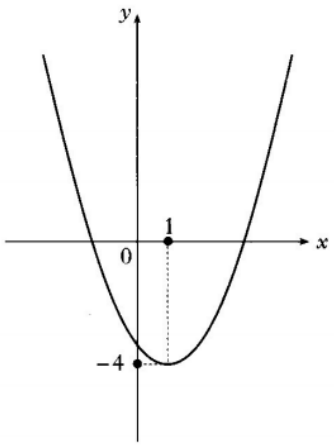
5. Given that $\overrightarrow{AB} = \begin{pmatrix} 3 \\ 0 \\ -3 \end{pmatrix}$ calculate $\left|\overrightarrow{AB}\right|$.

Give your answer as a surd in its simplest form. 3

6. Solve the inequation

$$13 + 4x < 18 - 7(2 - x).$$ 3

7. The graph of $y = x^2$ has been moved to the position shown in the diagram.



Write down the equation of the graph shown. 2

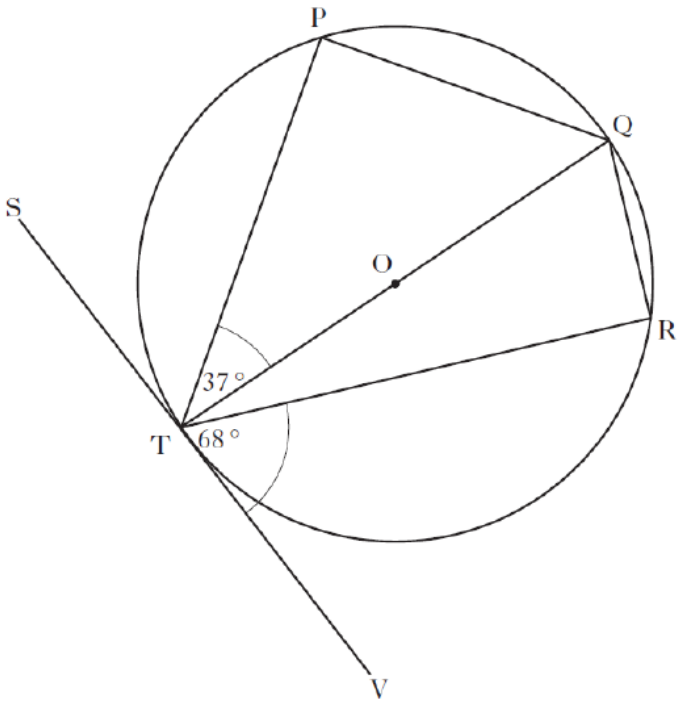
8. A straight line is represented by the equation $2y + x = 6$.

(a) Find the gradient of this line. 2

(b) This line crosses the y-axis at $(0, c)$. Find the value of c. 1

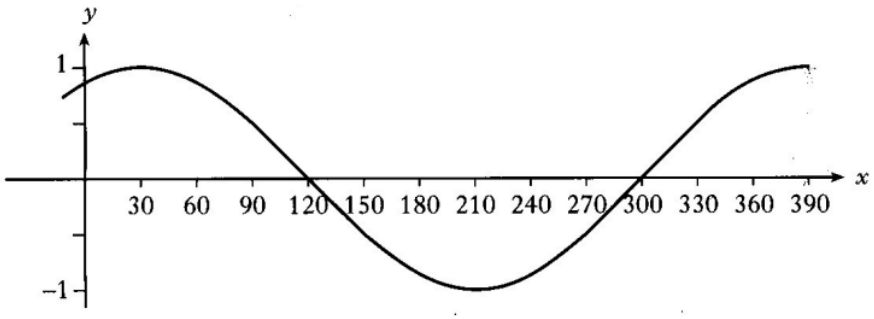
9. The tangent SV touches the circle, centre O, at T.

- Angle PTQ is 37°.
- Angle VTR is 68°.



Calculate the size of angle PQR. 3

10. The graph shown below has an equation of the form $y = \cos(x - a)°$.



Write down the value of a. 1

11. Cleano washing powder is on special offer.

Each box on special offer contains 20% more powder than the standard box.

A box on special offer contains 900 grams of powder.

How many grams of powder does the standard box contain? 3

12. A parabola has equation $y = x^2 - 3x + 5$.

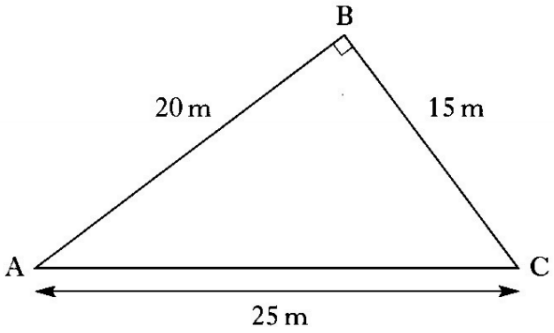
(a) Show that the parabola has no real roots. 2

(b) Write the equation in the form $y = (x - p)^2 + q$. 2

(c) Sketch the graph of $y = x^2 - 3x + 5$, showing the coordinates of the turning point and the point of intersection with the y-axis. 3

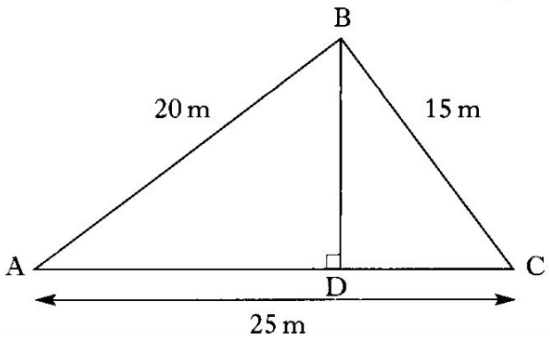
13. Triangle ABC is right-angled at B.

The dimensions are shown.



(a) Calculate the area of triangle ABC. 1

BD, the height of triangle ACB is drawn as shown.



(b) Use your answer to part (a) to calculate the height BD. 3

[End of question paper]