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N5

National
Qualifications
2021 ASSESSMENT RESOURCE

Mark

X847/75/01

Mathematics
Paper 1 (Non-calculator)

Duration — 1 hour 15 minutes

X8477501

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth

Day | Month | Year

Scottish candidate number

Total marks – 50

Attempt ALL questions.

You must 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.

Before leaving the examination room you must give this booklet to the Invigilator; if you do not, you may lose all the marks for this paper.

SQA ©

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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 $A = \frac{1}{2}ab\sin C$

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 $s = \sqrt{\dfrac{\Sigma(x - \bar{x})^2}{n - 1}}$

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

Total marks — 50

Attempt ALL questions

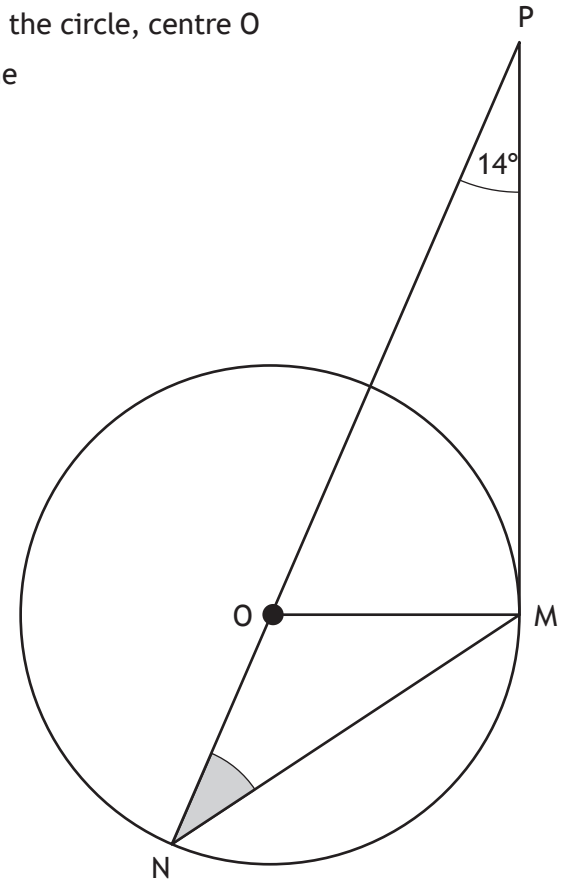
1. Calculate $|\mathbf{d}|$, the magnitude of vector $\mathbf{d} = \begin{pmatrix} 1 \\ -4 \\ 8 \end{pmatrix}$. **2**

2. Evaluate $5\frac{1}{2} - 1\frac{2}{7}$. **2**

3. Expand and simplify $(6x-5)(x+3)+2x(4-x)$. **3**

4. In the diagram shown below

- PM is a tangent to the circle, centre O
- PN is a straight line
- angle OPM is 14°.



Calculate the size of shaded angle ONM. **2**

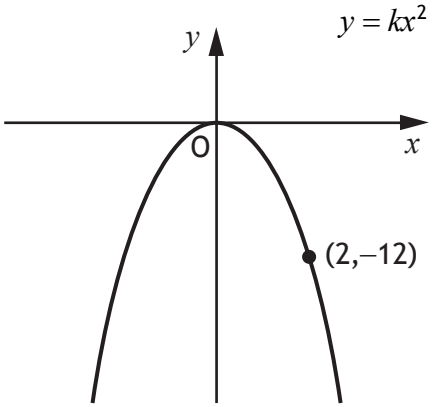
5. The number of absentees at Applegrove High School was recorded each day over a four-week period.

The results are shown below.

7	8	8	11	12	14	14	15	17	17
18	20	20	21	23	24	25	26	27	29

Find the semi-interquartile range of this data. **2**

6. The diagram below shows part of the graph of $y = kx^2$.



Find the value of k. **2**

7. Solve, algebraically, the system of equations

$$5c + 2d = 4$$
$$4c - 3d = 17$$

3

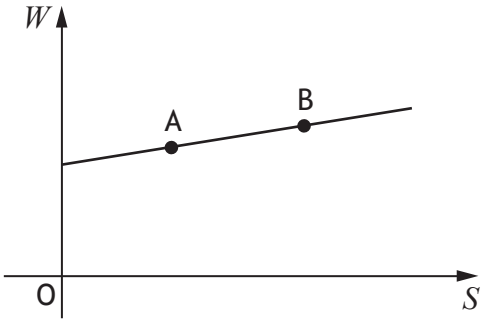
8. Determine the nature of the roots of the function $f(x) = x^2 + 4x - 7$. **2**

9. Express $\sqrt{50} + \sqrt{45} - \sqrt{2}$ in its simplest form. **3**

10. David works in a shop, and is paid weekly.

His wage is made up of a basic wage plus commission on his sales.

The graph shows his wage, W pounds, against his sales, S pounds.



Point A represents sales of £6000 and a wage of £450.

Point B represents sales of £7200 and a wage of £510.

(a) Find the equation of the line in terms of W and S.
Give the equation in its simplest form. **3**

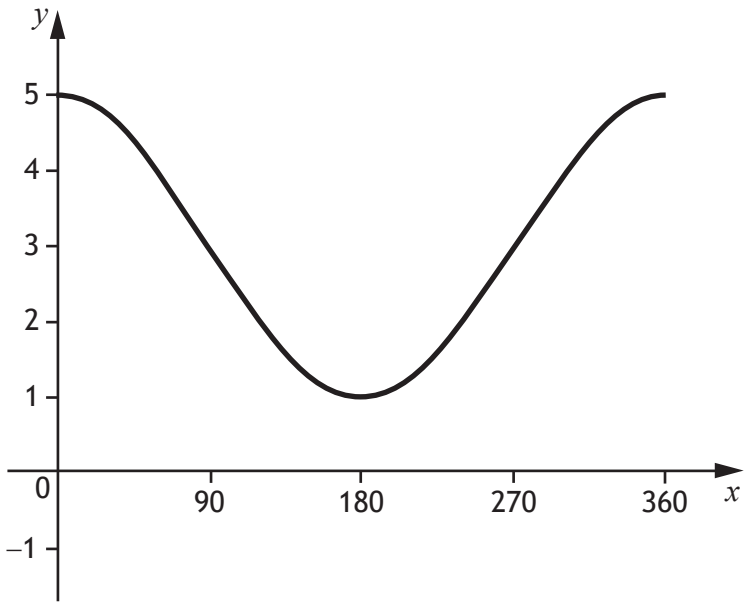
10. (continued)

(b) Calculate David's wage in a week when his sales are £1000. **1**

11. Solve, algebraically, the inequation $1-(x+4)>2x$. **3**

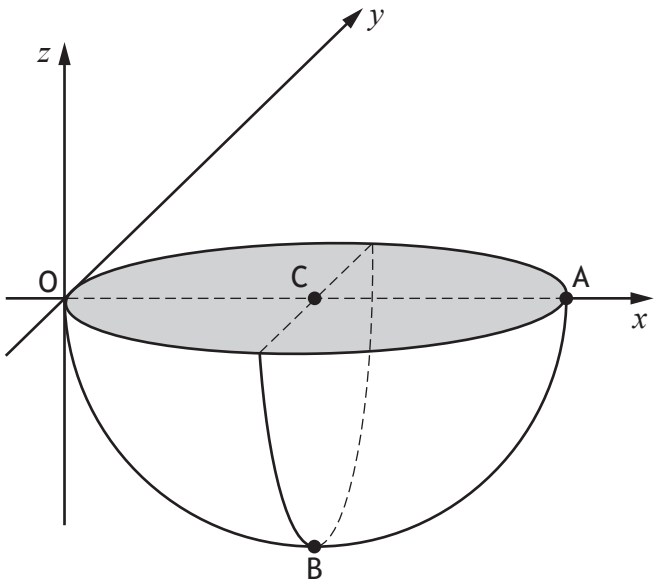
12. A band sold 2400 tickets for their gig in Edinburgh.
This was 75% of the number of tickets sold for their gig in Glasgow.
Calculate the number of tickets sold for their gig in Glasgow. **3**

13. The graph of $y = a\cos x^\circ + b$, $0 \leq x \leq 360$, is shown.



State the values of a and b. **2**

14. The diagram shows a hemisphere relative to the coordinate axes.



- A is the point (6, 0, 0)
- C is the midpoint of diameter OA
- B is vertically below C

(a) State the coordinates of B. **1**

(b) Calculate the volume of the hemisphere.

Give your answer in its simplest form in terms of π. **2**

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15. Evaluate $16^{\frac{3}{2}}$. **2**

16. The function $f(x)$ is defined by $f(x) = 4\sin 3x°$.

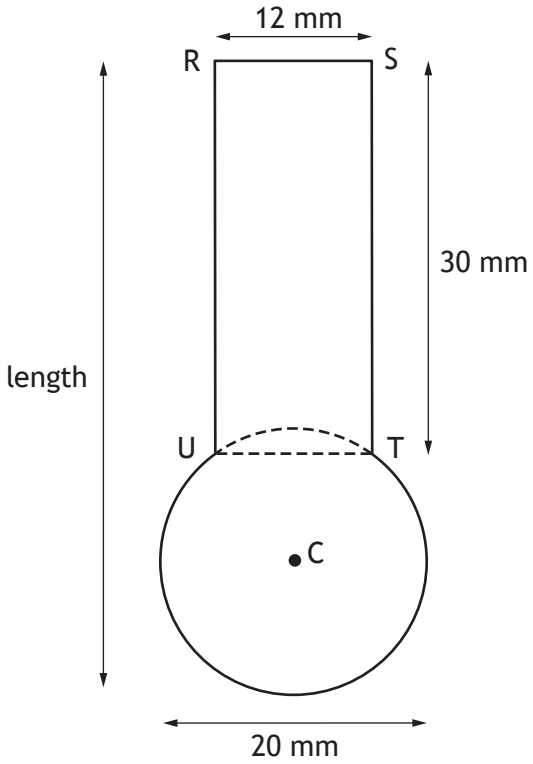
Evaluate $f(90)$. **2**

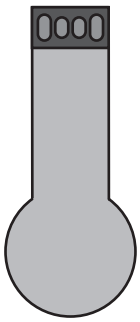
17. Sketch the graph of $y = 2(x-1)^2 + 4$.

On your sketch, show clearly the coordinates of the turning point and the point of intersection with the y-axis. **3**

18. The diagram below shows a design for a memory stick.

The design consists of a rectangle, RSTU and part of a circle, centre C.





memory stick

- RS = UT = 12 millimetres
- RU = ST = 30 millimetres
- The diameter of the circle is 20 millimetres
- UT is a chord of the circle

Calculate the length of the memory stick. **4**

19. Solve the equation **by factorising**

$$6x^2 + 13x - 5 = 0$$ **3**

[END OF QUESTION PAPER]

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