N5	FOR OFFICIAL USE					
	Qualifications 2018			Mar	rk	
X847/75/01		Mathematics Paper 1 (Non-Calculator)				
FRIDAY, 4 MAY 9:00 AM – 10:15 AM			*	× X 8 4 7	7501*	
Fill in these boxes and read what is printed below.						
Full name of centre		lowr				
Forename(s)	Surname			Numbe	r of seat	
Date of birth Day Month	Year Scottis	h candida	te number			
Total marks — 50						
Attempt ALL questions.	tor					

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.

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FORMULAE LIST

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

 $V = \frac{1}{3}Ah$

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:

Standard deviation:

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

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



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Total marks — 50 Attempt ALL questions

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

2. Expand and simplify $(3x+1)(x-1)+2(x^2-5)$.



2



3. Solve, algebraically, the system of equations

$$4x + 5y = -3$$

 $6x - 2y = 5.$ 3

4. Two vectors are given by $\mathbf{u} = \begin{pmatrix} 1 \\ 5 \\ 1 \end{pmatrix}$ and $\mathbf{u} + \mathbf{v} = \begin{pmatrix} 6 \\ -4 \\ 3 \end{pmatrix}$.

Find vector $\ensuremath{\mathbf{v}}\xspace$

Express your answer in component form.

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5. Solve

$$x^2 - 11x + 24 = 0$$
.

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



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7. The cost of a journey with Tom's Taxis depends on the distance travelled.

The graph below shows the cost, P pounds, of a journey with Tom's Taxis against the distance travelled, d miles.



Point A represents a journey of 8 miles which costs £14. Point B represents a journey of 12 miles which costs £20.

(a) Find the equation of the line in terms of *P* and *d*.Give the equation in its simplest form.

3





8. Determine the nature of the roots of the function $f(x) = 2x^2 + 4x + 5$.



- 9. In the diagram shown below, ABCDEFGHJK is a regular decagon.
 - Angle KLJ is 17°.
 - AKL is a straight line.



Calculate the size of shaded angle KJL.

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- XZ = 10 centimetres
- YZ = 8 centimetres
- $\cos Z = \frac{1}{8}$.



Calculate the length of XY.



11. Express $\frac{9}{\sqrt{6}}$ with a rational denominator.

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Give your answer in its simplest form.

12. Given that $\cos 60^\circ = 0.5$, state the value of $\cos 240^\circ$.



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 13. The diagram shows a triangular prism, ABCDEF, relative to the coordinate axes.



- AD = AE.
- DC = 8 units.
- Edges EF, DC and AB are parallel to the *y*-axis.

Write down the coordinates of B and C.

* X 8 4 7 7 5 0 1 1 1 *







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17. A square based pyramid is shown in the diagram below.



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The square base has length 6 centimetres.

The volume is 138 cubic centimetres.

Calculate the height of the pyramid.



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18. Express $\sin x^{\circ} \cos x^{\circ} \tan x^{\circ}$ in its simplest form. Show your working.





(ii) Hence state the equation of the axis of symmetry of the graph of $y = x^2 - 6x - 81$.



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19. (continued)

(b) The roots of the equation $x^2 - 6x - 81 = 0$ can be expressed in the form $x = d \pm d\sqrt{e}$.

Find, algebraically, the values of d and e.

[END OF QUESTION PAPER]



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	FOR OFFICIAL USE					
N5	National Qualifications 2018		Mark			
X847/75/02			Mathematics Paper 2			
FRIDAY, 4 MAY 10:35 AM – 12:25 PM		 *	× X 8 4 7 7 5 0 2 *			
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 — 60						
Attempt ALL questions.						

You may use a calculator.

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Total marks — 60 Attempt ALL questions

 Households in a city produced a total of 125 000 tonnes of waste in 2017. The total amount of waste is expected to fall by 2% each year. Calculate the total amount of waste these households are expected to produce in 2020.





2. The diagram below shows a sector of a circle, centre C.



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The radius of the circle is 7.4 centimetres.

Calculate the length of the major arc AB.







3. Find $|\mathbf{r}|$, the magnitude of vector $\mathbf{r} = \begin{pmatrix} 24 \\ -12 \\ 8 \end{pmatrix}$.

4. Solve, algebraically, the inequation

$$3x < 6(x-1)-12$$
.



4

5. A farmers' market took place one weekend.

Stallholders were asked to record the number of customers who visited their stall.

The number of customers who visited six of the stalls on Saturday were as follows:

120 126 125 131 130 124

(a) Calculate the mean and standard deviation of the number of customers.





6. A function is defined as f(x) = 5 + 4x. Given that f(a) = 73, calculate *a*.



7. A toy company makes juggling balls in the shape of a sphere with a diameter of 6.4 centimetres.



Calculate the volume of one juggling ball. Give your answer correct to 2 significant figures.

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10. In the diagram below, \overrightarrow{AB} and \overrightarrow{EA} represent the vectors **u** and **w** respectively.



- $\overrightarrow{ED} = 2\overrightarrow{AB}$
- $\overrightarrow{EA} = 2\overrightarrow{DC}$

Express \overrightarrow{BC} in terms of **u** and **w**. Give your answer in its simplest form.

* X 8 4 7 7 5 0 2 1 1 *

 11. Venus and Earth are two planets within our solar system.

 Image: Construction of the system of the volume of Venus is approximately 9·3×10¹¹ cubic kilometres. This is 85% of the volume of Earth.

 Calculate the volume of Earth.

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12. The shape below is part of a circle, centre O.



The circle has radius 13 centimetres. AB is a chord of length 20 centimetres. Calculate the width of the shape.



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13. A ferry and a trawler receive a request for help from a stranded yacht.

On the diagram the points F, T and Y show the positions of the ferry, the trawler and the yacht respectively.



- FY is 7.2 kilometres.
- TY is 5.6 kilometres.
- FT is 10.3 kilometres.
- F is on a bearing of 240° from T.

Calculate the bearing of the yacht from the trawler.



14. A straight line has equation 2x - 5y = 20. Find the coordinates of the point where this line crosses the *y*-axis.

15. Express

$$\frac{n}{n^2-4} \div \frac{3}{n-2}, \quad n \neq -2, n \neq 2$$

as a single fraction in its simplest form.



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16. Chris wants to store his umbrella in a locker.

The locker is a cuboid with internal dimensions of length 40 centimetres, breadth 40 centimetres and height 70 centimetres.



The umbrella is 85 centimetres long.

He thinks it will fit into the locker from corner P to corner M.

Is he correct?

Justify your answer.

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 17. In the diagram below AOD is a sector of a circle, with centre O, and BOC is a triangle.



In sector AOD:

- radius = 30 centimetres
- angle AOD = 75°.

In triangle OBC:

- OB = 38 centimetres
- OC = 55 centimetres.

Calculate the area of the shaded region, ABCD.





(a) Show that the two cartons are **not** mathematically similar.





2

18. (continued)

The large carton is redesigned so that the two cartons are **now** mathematically similar.

The volume of the redesigned large carton is 1500 cubic centimetres.

(b) Calculate the depth of the redesigned large carton.

[END OF QUESTION PAPER]



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ACKNOWLEDGEMENTS

Question 11 – Venus: Dotted Yeti/Shutterstock.com Earth: TeddyGraphics/Shutterstock.com

Question 18 – Popcorn carton: Richard Peterson/Shutterstock.com

