N5

Uddingston Grammar School

Prelim Examination 2017 / 18

MATHEMATICS

National Qualifications - National 5

Paper 1 (non-calculator)

Time allowed - 1 hour 15 minutes

Fill in these boxes and read carefully what is printed below

Full name of centre | **Town**

Forename(s) | **Surname**

Total marks - 50

Date of birth
Day Month Year

Candidate number

Seat number

1. You may NOT use a calculator.
2. Use **blue** or **black** ink. Pencil may be used for graphs and diagrams only.
3. Write all working and answers in the spaces provided. Additional space for answers is provided at the end of the booklet. If you use this space, write clearly the number of the question you are attempting.
4. Unless otherwise stated, answers should be given to 1 decimal place.
5. Full credit will be given only where the solution contains appropriate working.
6. State the units for your answer where appropriate.
7. Before leaving the examination room you must give up this booklet to the invigilator. If you do not, you may lose all the marks for this paper.

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: Area = $\frac{1}{2} ab \sin C$

Volume of a sphere: Volume = $\dfrac{4}{3}\pi r^3$

Volume of a cone: Volume = $\dfrac{1}{3}\pi r^2 h$

Volume of a Pyramid: Volume = $\dfrac{1}{3}Ah$

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.

Do not write in this margin.

Marks

All questions should be attempted

1. Evaluate

$$5\frac{3}{8} - 3\frac{3}{5}$$

2

2. Find the resultant vector $2\boldsymbol{u} - \boldsymbol{v}$ when $\boldsymbol{u} = \begin{pmatrix} -2 \\ 3 \\ 5 \end{pmatrix}$ and $\boldsymbol{v} = \begin{pmatrix} 0 \\ -4 \\ 7 \end{pmatrix}$.

Express your answer in component form.

2

3. Solve algebraically, the inequality.

$$3(2 - x) + 7 \geq 2x + 3$$

3

Marks

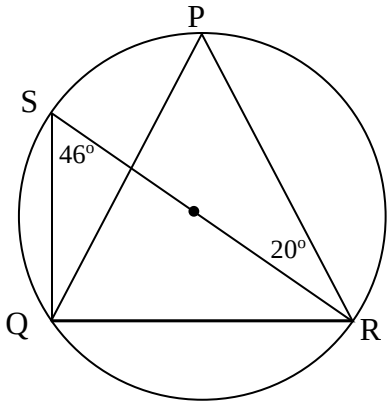
4. The waiting times, in minutes, at a hospital outpatient clinic were

12 34 25 21 52 43 21 23 34 43 33 52 21 23

(a) Find the median and upper and lower quartiles of these times. **2**

(b) Find the semi-interquartile range of these times. **1**

5. In the diagram below triangle PQR is isosceles and SR is a diameter of the circle. Angle QSR = 46° and angle PRS = 20°.



Calculate the size of angle QPR. **3**

Marks

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6. (a) Simplify $\frac{a^{\frac{1}{2}} \times a^{\frac{3}{2}}}{a^3}$,

giving the answer with a positive power.

3

(b) Express $\sqrt{40} + 4\sqrt{10} + \sqrt{90}$ as a surd in its simplest form **3**

7. Multiply out the brackets and collect like terms.

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

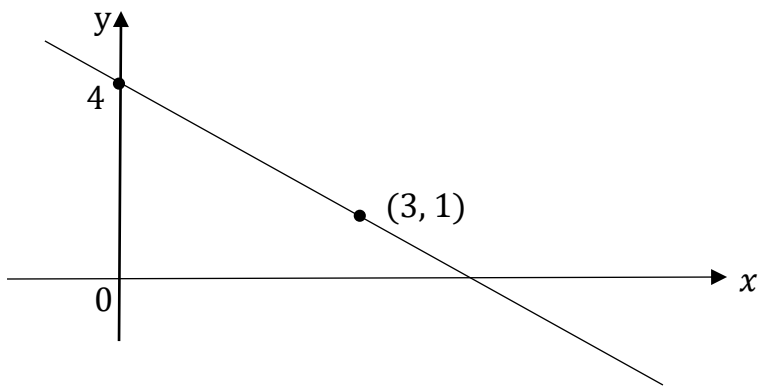
3

Do not write in this margin.

Marks

8. Simplify $\dfrac{x^2 - 4x}{x^2 + x - 20}$ **3**

9. Find the equation of the straight line shown in the diagram below. **3**



10. Express y = x^2 - 6x – 5 in the form y = (x + a)² + b **3**

Marks

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11. Charlie is making costumes for a school show.

One day he made 2 cloaks and 3 dresses.

The total amount of material he used was 9·6 square metres.

(a) Write down an equation to illustrate this information. **1**

(b) The following day Charlie made 3 cloaks and 4 dresses.

The total amount of material he used was 13·3 square metres.

Write down an equation to illustrate this information. **1**

(c) Calculate the amount of material required to make one cloak and the amount of material required to make one dress. **4**

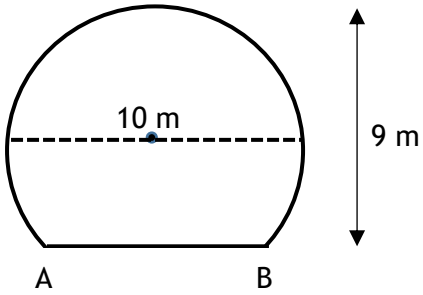
Marks

12. Express $\frac{4}{\sqrt{8}}$ with a rational denominator.

Give your answer in its simplest form.

3

13. A tunnel has been constructed through a mountain to reduce the driving time to a ski resort.



The height of the tunnel is 9 metres.
The diameter of the tunnel is 10 metres.

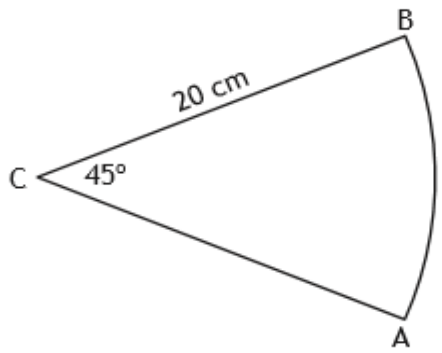
Calculate the width of the road, marked AB on the diagram. **4**

Do not write in this margin.

Marks

14. Evaluate $27^{\frac{4}{3}}$ **2**

15. The diagram shows a sector of a circle, centre C.



The radius of the circle is 20 centimetres and angle ACB is 45°.

Calculate the perimeter of the sector.

(Use $\pi = 3 \cdot 14$) **4**

End of Question Paper

ADDITIONAL SPACE FOR ANSWERS

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Uddingston Grammar School

Prelim Examination 2017 / 18

MATHEMATICS

National Qualifications - National 5

Paper 2 (Calculator)

Time allowed - 1 hour and 50 minutes

Fill in these boxes and read carefully what is printed below

Full name of centre | **Town**

Forename(s) | **Surname**

Total marks - 60

Date of birth

Day Month Year

Candidate number

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All questions should be attempted

Marks

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1. Factorise $5x^2 - 45$ **2**

2. The Clydeside Bank are looking to reduce the number of paper statements sent out to customers by 30% every year.

If they sent out 3,500,000 paper statements in 2016, how many will they expect to send out in 2020? **3**

3. Find $|\mathbf{v}|$, the magnitude of vector $\mathbf{v} = \begin{pmatrix} 18 \\ -14 \\ 3 \end{pmatrix}$. **2**

Marks

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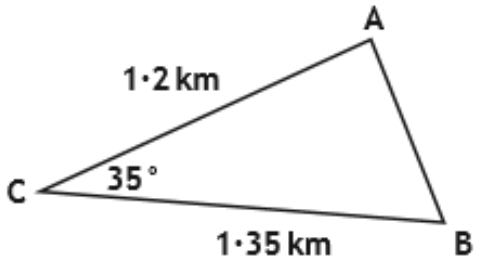
4. Triangle ABC is shown below.



Calculate the length of AB. **3**

5. Mr Burns paid a bill for £9975 to have a new kitchen installed.

This price included a discount of 5% for paying his bill on time.

How much **extra** would Mr. Burns have had to pay if he had been late with his payment? **4**

Marks

6. If A is the point (8, 10, 2) and B is (12, 5, 6), find the components of the vector $\overrightarrow{AB}$. **2**

7. The population of the UK in 2017 was approximately $6{\cdot}6 \times 10^7$.

The population of Europe in the same year was 11·3 times bigger than the UK.

Calculate the population of Europe giving your answer in Scientific Notation correct to 3 significant figures. **3**

8. Express as a fraction in its simplest form

$$\frac{4}{(x-3)} - \frac{5}{(2x-1)}$$ **3**

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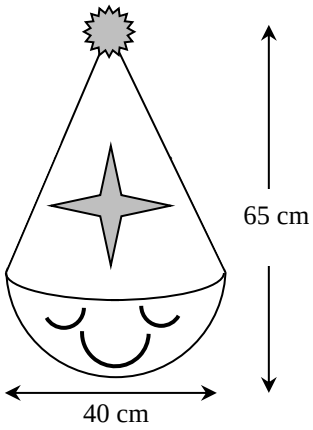
Marks

9. A fancy dress shop has this sign over its door. It is made up from a cone and a hemisphere.

The diameter of both is 40cm and its height is 65cm.

Calculate the volume of the sign.



5

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Marks

10. The Highland Ski Resort keeps a record of the snow fall in millimetres for one week of the season.

7 16 20 21 23 24 22

(a) Calculate the mean and sample standard deviation. **4**

(b) The Glen resort nearby has a mean snowfall of 25 millimetres and a sample standard deviation of 8.2.

Make **two** valid comparisons about the snow fall at the two resorts. **2**

Marks

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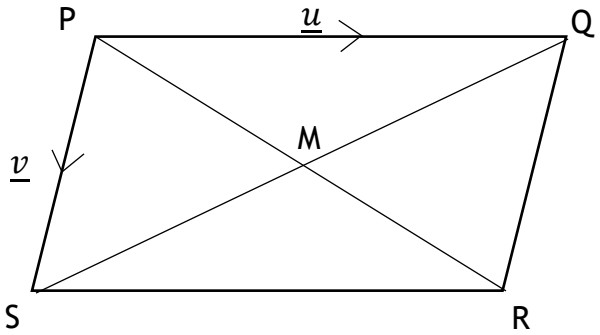
11. Shown is a parallelogram PQRS, with vector $\overrightarrow{PQ} = \underline{u}$ and vector $\overrightarrow{PS} = \underline{v}$.



Find the following vectors in terms of $\underline{u}$ and $\underline{v}$:-

(a) $\overrightarrow{PR}$ 1

(b) $\overrightarrow{RM}$ 2

Marks

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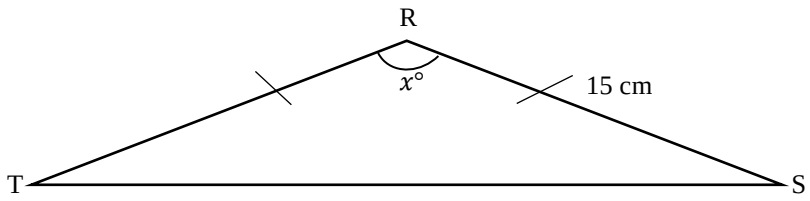
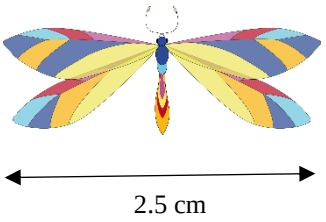
12.

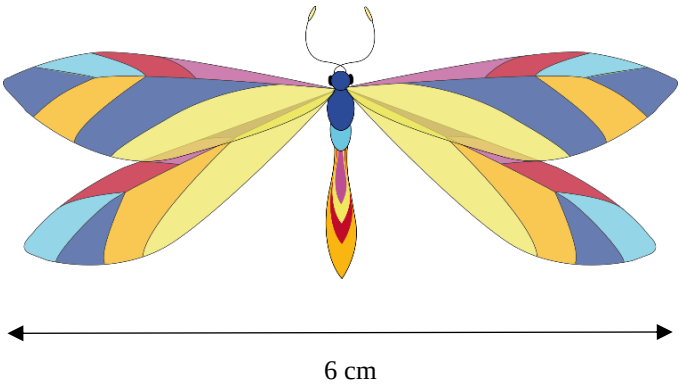


The area of isosceles triangle RST is 72 cm^2.

Calculate the size of obtuse angle TRS. **4**

13.





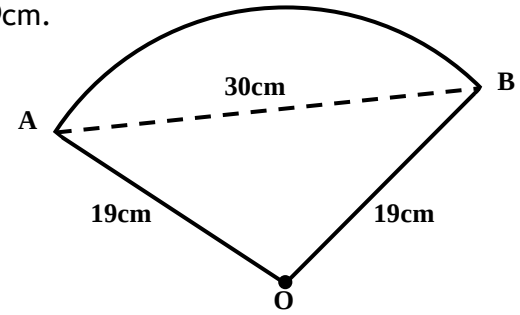
The dragonfly badges shown above are mathematically similar.

Given the area of metal required to make the smaller badge is 4.5 cm^2, what area of metal will be required to make the large badge?

Give your answer correct to 2 significant figures. **4**

14. The diagram below shows a sector of a circle, centre O.

The chord AB = 30 cm and OA = OB = 19cm.



(a) Calculate the size of angle AOB correct to the nearest degree. **4**

(b) Hence find the area of the sector AOB. **3**

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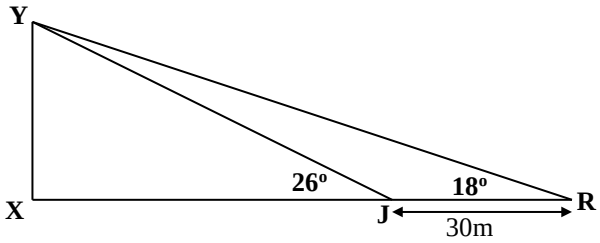
Marks

15. The Kelpies are a famous Scottish landmark.

John (J) and Robert (R) are trying to find out what height they are.

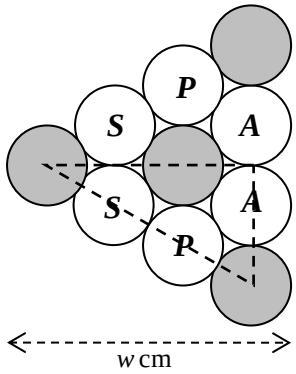
John stands a certain distance away and measures the angle of elevation to be 26^o.

Robert stands 30m away from John and finds the angle of elevation is 18^o.



Calculate the height, XY, of the Kelpies giving your answer to the nearest metre. **5**

16. A sign for a spa is made up from 10 circles arranged as shown in the diagram.



If the radius of each of the circles in the above diagram is 7 cm, calculate the overall width, *w* cm, of the ornament.. **4**

End of Question Paper

ADDITIONAL SPACE FOR ANSWERS

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