



Name \_\_\_\_\_

Teacher \_\_\_\_\_

## Mathematics

### Paper 2

#### National 5 **Booster Paper C2**

Duration: 1 hour 50 minutes

**Total Marks - 60**

Attempt **ALL** questions.

**You may 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.

Use **blue** or **black** ink.

#### Notes:

- This is a **Booster Paper**. Your May exam will be (a bit) harder than this.
- The Booster Papers get **more challenging** as you work through them.
- The final Booster Paper will be as challenging as your May exam.
- The number of marks indicated beside each question is intended as a guide and may differ slightly from SQA marking instructions.
- These original papers are **produced independently of the SQA** and are **free of charge**.
- All Booster Papers and answers can be found at [www.maths180.com/BoosterPapers](http://www.maths180.com/BoosterPapers)

## FORMULAE LIST

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

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

Standard deviation:  $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$

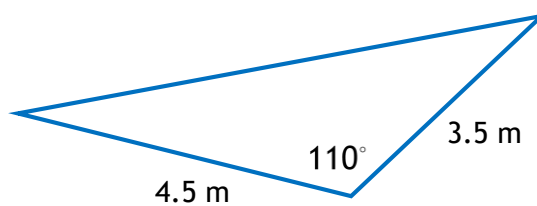
or  $s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n - 1}}$ , where  $n$  is the sample size.

Total marks - 60

Attempt ALL questions

1. Solve  $4\sin x^\circ + 3 = 1$  where  $0 \leq x \leq 360^\circ$  3

2. Calculate the area of this triangle.



2

3. The number of butterflies visiting a garden was recorded each day for 10 days in July of 2008. The results are shown below.

12    18    10    18    11    17    17    19    14    15

- (a) Find the median value **and** the semi-interquartile range for this data set.      3

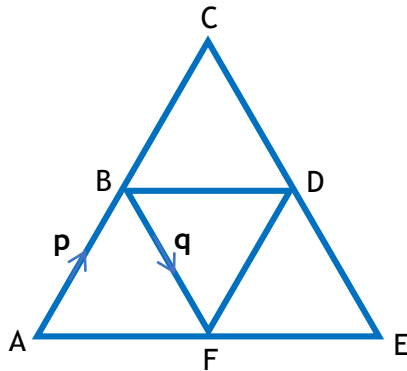
The procedure was repeated in the same garden for 7 days in July of 2018.

The median number of butterflies was 14 and the semi-interquartile range was 5.

- (b) Make two valid comparisons between the 2008 and the 2018 data sets.      2

4. Solve, algebraically,  $\frac{3x+8}{4} + \frac{3x+2}{2} = 8$  3

5. This diagram is formed from four congruent equilateral triangles.  
 In the diagram,  $\overrightarrow{AB}$  and  $\overrightarrow{BF}$  represent the vectors  $\mathbf{p}$  and  $\mathbf{q}$  respectively.



(a) Express  $\overrightarrow{AF}$  in terms of  $\mathbf{p}$  and  $\mathbf{q}$ . 1

(b) Express  $\overrightarrow{EB}$  in simplest form in terms of  $\mathbf{p}$  and  $\mathbf{q}$ . 2

6. A shirt has been increased in price by 24% to £49.60.  
Calculate the original value.

3

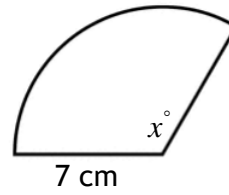
7. Simplify  $x^3(2x^5 + x^{-2})$

2

8. This sector has an arc length of 16.5 centimetres and radius 7 centimetres.

Calculate the size of angle  $x^\circ$

Give your answer to the nearest degree.



3

9. Use the discriminant to determine the nature of the roots of  $y = 9x^2 - 12x + 4$ .

3

10. These two milk cartons are mathematically similar in shape.



The volume of the smaller carton is 135 cubic centimetres.

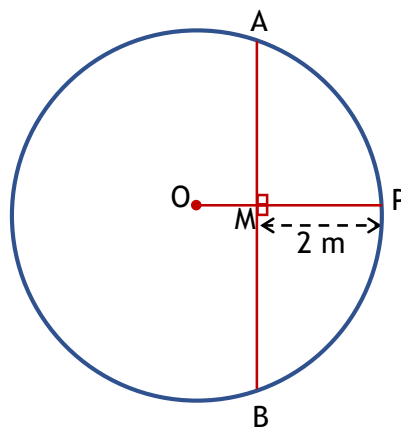
The volume of the larger carton is 625 cubic centimetres.

Find the height ( $h$ ) of the larger carton.

3



11. This circle has its centre at  $O$ .  
 $OP$  is a radius with length 3.25 metres.  
The line  $MP$  has length 2 metres.



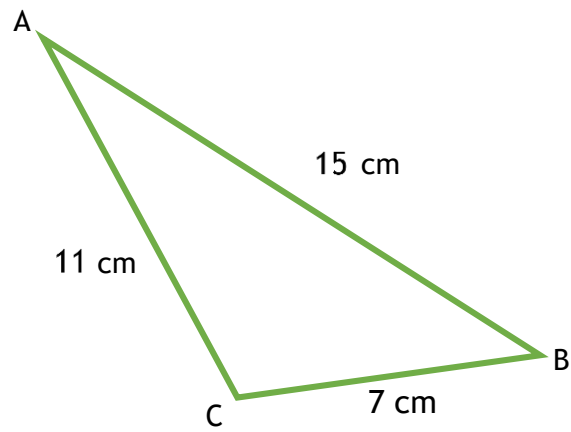
(a) Find the length of the line  $OM$ .

1

(b) Hence, find the length of the chord  $AB$ .

3

12. Calculate the size of angle CAB.  
Round your answer to one decimal place.



3

13. Solve the equation

$$3x^2 - 4x - 8 = 0$$

Give your answer(s) correct to three significant figures.

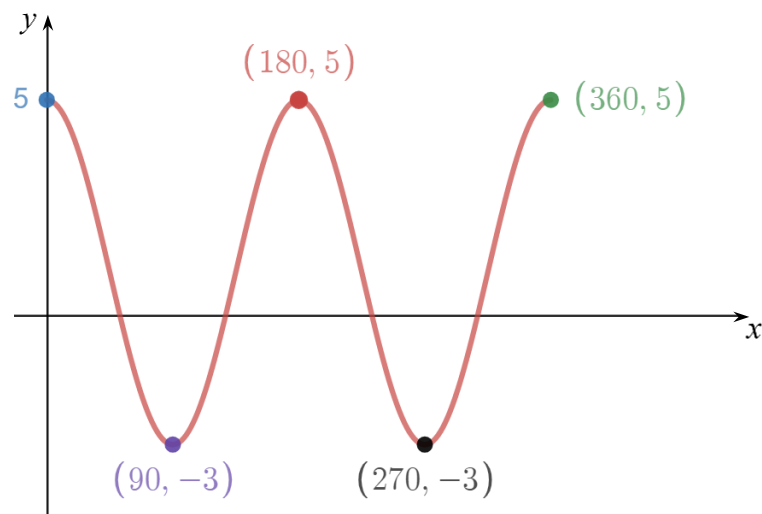
4

14. Solve the equation  $\frac{1}{4x} + \frac{8}{x} = 11$

Give your answer in its simplest form.

3

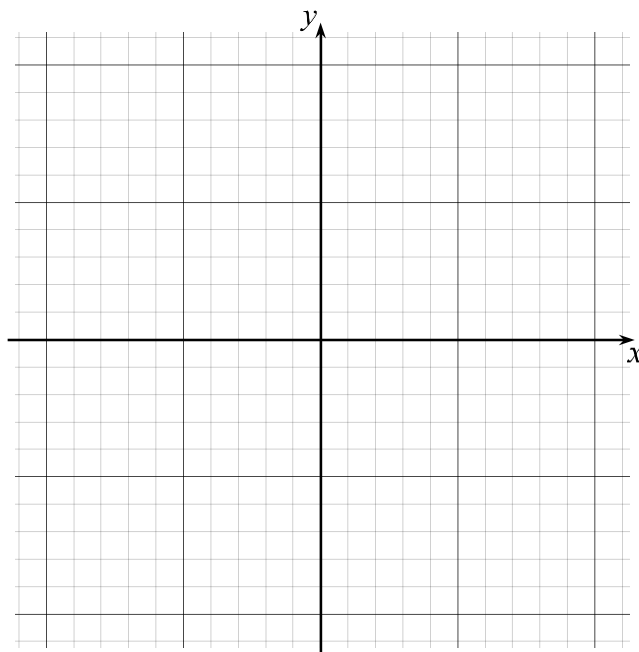
15. This graph has an equation of the form  $y = a \cos bx + c$



Write down the values of  $a$ ,  $b$  and  $c$ .

3

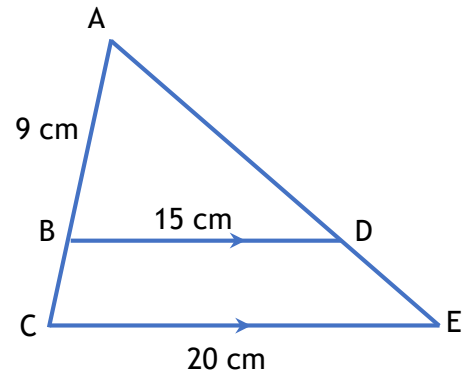
16. (a) Write down the coordinates of the turning point of the graph of  $y = (x - 1)^2 + 2$ . 2
- (b) Write down equation of the axis of symmetry. 1
- (c) Write down the coordinates of the point where the graph meets the  $y$  - axis. 1
- (d) Sketch and annotate fully the graph of  $y = (x - 1)^2 + 2$ . 2



17. In the figure opposite,  $BD = 14$ ,  $CE = 20$  and  $AB = 9$ .

Find  $BC$ .

All lengths are in centimetres.

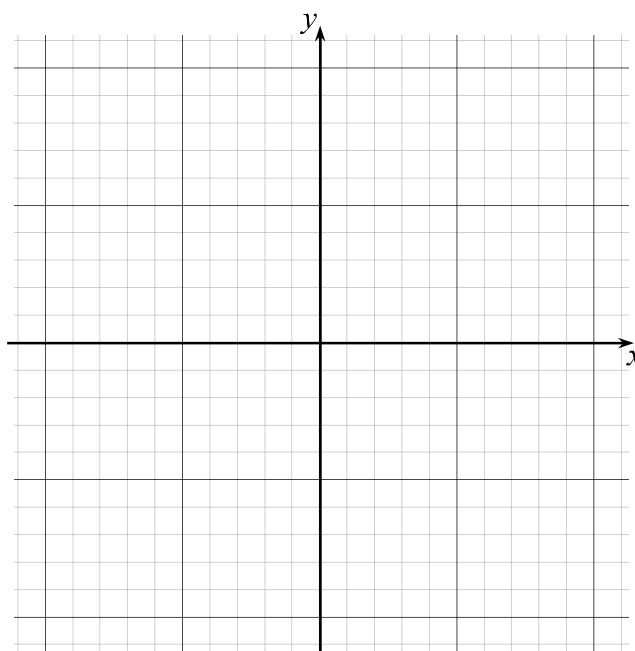


18. Simplify  $\frac{\cos x \tan x}{\sin x}$

2

19. On the axes provided, draw the straight line with equation  $y = -2x + 7$ .  
Mark on the coordinates of the points where the line crosses the axes.

2



**End of Booster Paper C2**