1st Class Maths

# PREDICTED PAPER

Video Solutions

| Candidate Surname | Other names |
|---|---|
| | |

| Centre Number | Candidate Number |
|---|---|
| | |

**Monday 13 June 2022**

**Morning (Time: 1 hours 30 minutes)**

# Mathematics

**Paper 3 (Calculator)**

**Higher Tier**

**You must have: Ruler graduated in centimetres and millimetres, protractor, pairs of compasses, pen, HB pencil, eraser. Tracing paper may be used.**

**Total Marks**

## Student Self Reflection

Topics I need to ***revise***

Topics I need to ***learn***

Silly Mistakes?

Target mark for next time

**Answer ALL questions**

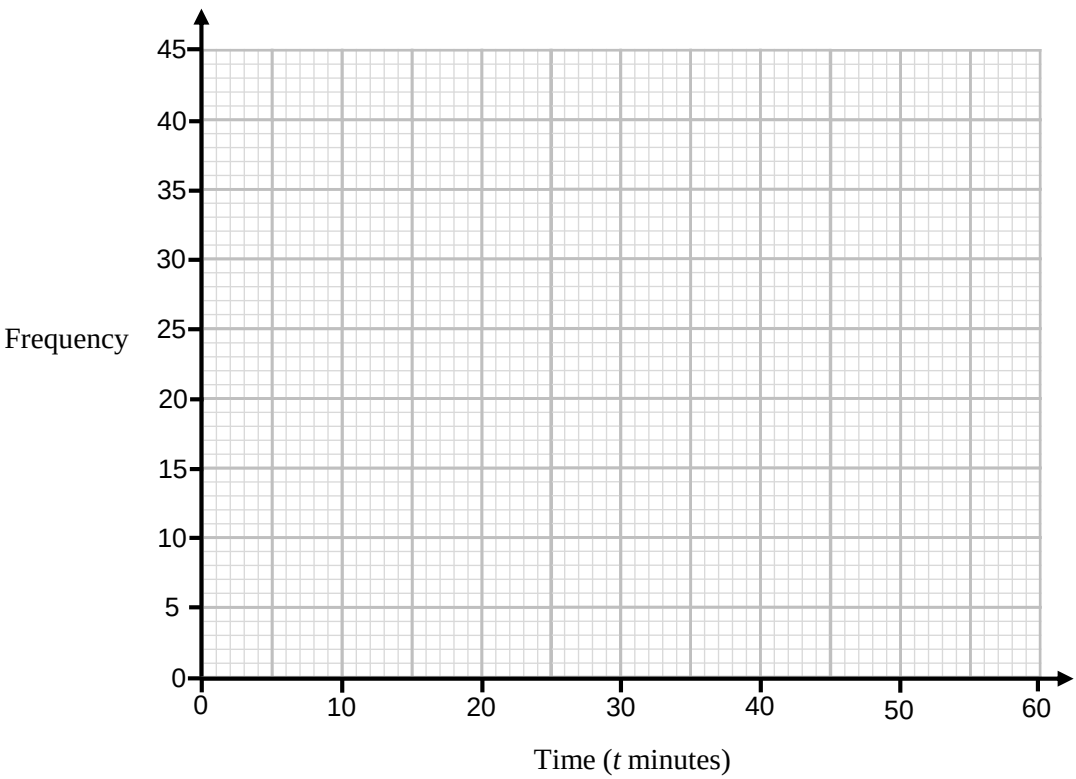
**Write your answers in the spaces provided**

**You must write down all the stages in your working.**

**1** The table shows information about the time, $t$ minutes, that 100 students spent revising.

| Time ($t$ minutes) | Frequency |
|---|---|
| $10 < t \leq 20$ | 7 |
| $20 < t \leq 30$ | 20 |
| $30 < t \leq 40$ | 41 |
| $40 < t \leq 50$ | 19 |
| $50 < t \leq 60$ | 13 |

On the grid, draw a frequency polygon for the information in the table.




**(Total for Question 1 is 2 marks)**

**2** $v = u + at$

$u = 7$ $a = 9.8$ $t = 15$

(a) Work out the value of $v$.

.....

(2)

(b) Make $t$ the subject of $v = u + at$

.....

(2)

**(Total for Question 2 is 4 marks)**

**3** Martin buys a 350 g chocolate bar.

The information is on the packaging.

| Nutritional Information (per 100g) | |
|---|---|
| Fat | 28 g |
| Sugars | 56 g |
| Other | 16 g |

Martin eats 60% of the chocolate bar.

Work out how many grams of sugar Martin has eaten.

..... g

**(Total for Question 3 is 3 marks)**

**4** A bag contains only green, red and blue counters.

In total there are 800 counters in the bag.
26 of the counters are blue.
35% of the counters are green.

The ratio of red counters to blue counters is $k : 1$.

Find the value of $k$.

.....

**(Total for Question 4 is 3 marks)**

**5** The population of Manchester rose by 20% between 2009 and 2019.

In 2019 the population was 576,000.

Work out the population of Manchester in 2009.

.....

**(Total for Question 5 is 2 marks)**

**6** Keane drives his car 180 miles from his home in Bristol to Liverpool.

He leaves his home at 09 30 and arrives in Liverpool at 12 42.

Work out the average speed of Keane's journey in mph.

..... mph

**(Total for Question 6 is 4 marks)**

**7** The table shows information about the daily temperature during a school week.

| Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|
| 18 °C | 19 °C | 26 °C | 20 °C | 21 °C |

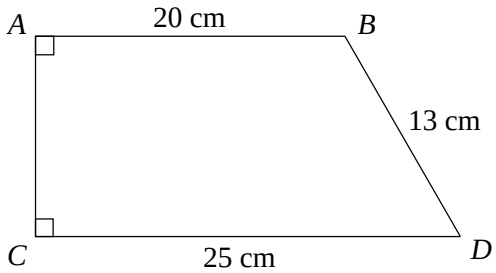
Calculate the percentage decrease in temperature between Wednesday and Thursday.

Write your answer to 1 decimal place.

..... %

**(Total for Question 7 is 3 marks)**

**8**




*ABCD* is a trapezium.
Line *AB* is parallel to line *CD*.

Calculate the area of the trapezium *ABCD*.

..... $cm^2$

**(Total for Question 8 is 4 marks)**

**9** Abu is trying to open his safe but has forgotten the code.
He finds some information that he had written to help him remember the code.

The code is a 4 digit number.
The number is even.
The first digit is a number 7.
The second digit is a multiple of 3.
The third digit is a prime number.

Work out how many different possible codes fit Abu's information.

.....

**(Total for Question 9 is 3 marks)**

**10** $\mathbf{a} = \begin{pmatrix} x + 4 \\ 8 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 5 \\ y \end{pmatrix}$ $2\mathbf{a} - 3\mathbf{b} = \begin{pmatrix} 11 \\ 25 \end{pmatrix}$

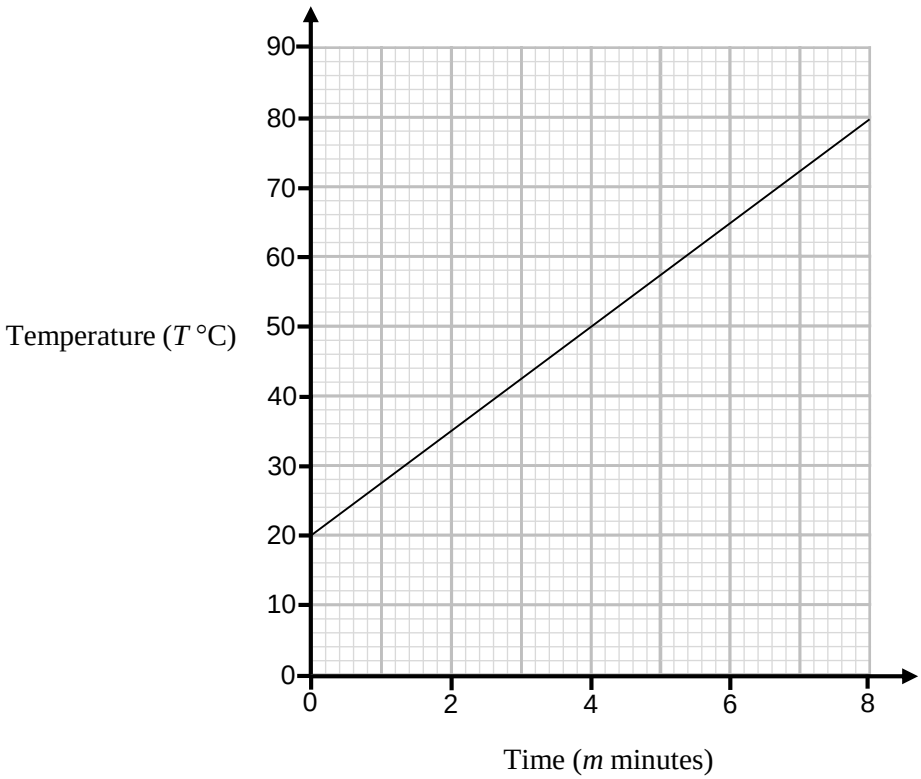
Work out the values of $x$ and $y$.

$x =$ .....

$y =$ .....

**(Total for Question 10 is 4 marks)**

**11** The graph shows the temperature ($T$ °C) of a liquid that is being heated at time $m$ minutes.




(a) Find the gradient of the graph.

.....

**(2)**

(b) Explain what this gradient represents.

.....

.....

**(1)**

The graph intersects the temperature axis at $T = 20$

(c) Explain what this intercept represents.

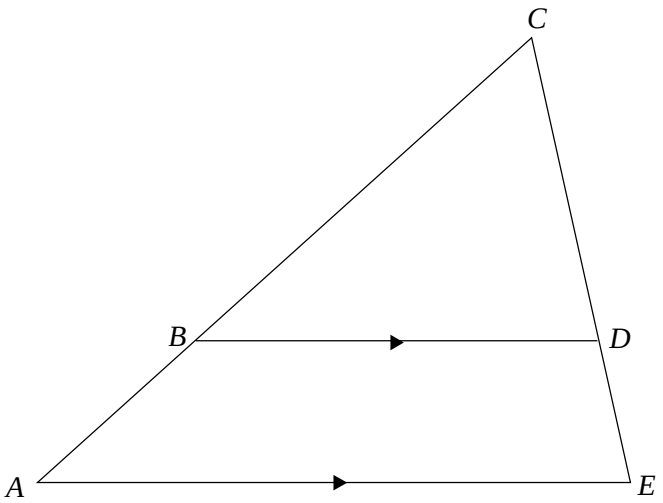
.....

.....

**(1)**

**(Total for Question 11 is 4 marks)**

**12**




*ABC* and *EDC* are straight lines.
*AE* is parallel to *BD*.

*AC* = 42 cm
BC = 30 cm
*AE* = 35 cm

(a) Work out the length of *BD*.

.....cm

(2)

*CD* = 14 cm

(b) Work out the length of *DE*.

.....cm

(2)

**(Total for Question 12 is 4 marks)**

**13** $m = \dfrac{20000}{p^2}$

$p = 12.4$ correct to one decimal place.

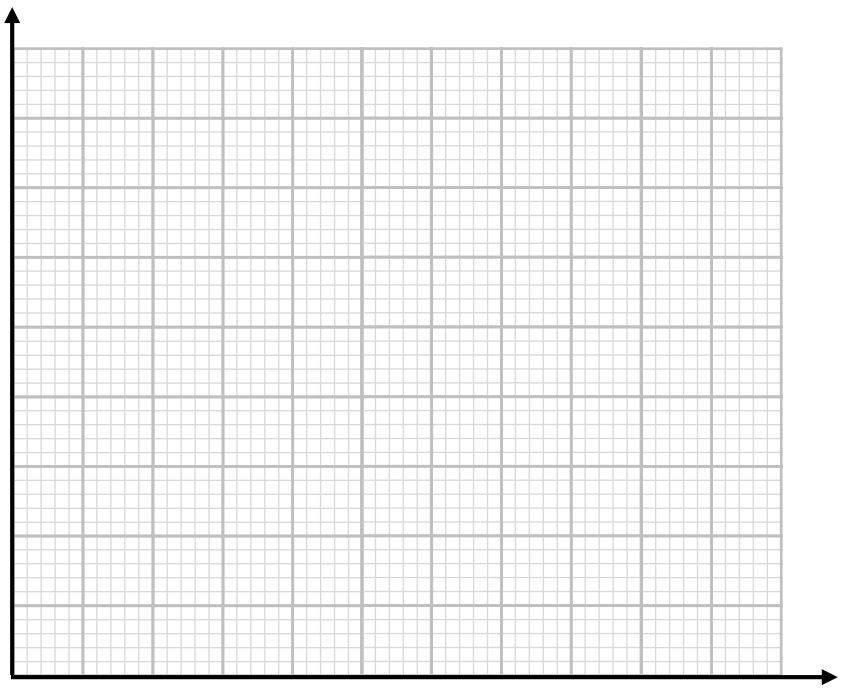
By considering bounds, work out the value of $m$ to a suitable degree of accuracy.
Give a reason for your answer.

**(Total for Question 13 is 4 marks)**

**14** The table gives information about the mass, in kg, of 60 dogs.

| Mass ($m$ kg) | Frequency |
|---|---|
| $0 < m \leq 5$ | 18 |
| $5 < m \leq 15$ | 28 |
| $15 < m \leq 25$ | 9 |
| $25 < m \leq 50$ | 5 |

(a) On the grid, draw a histogram for this information.



**(3)**

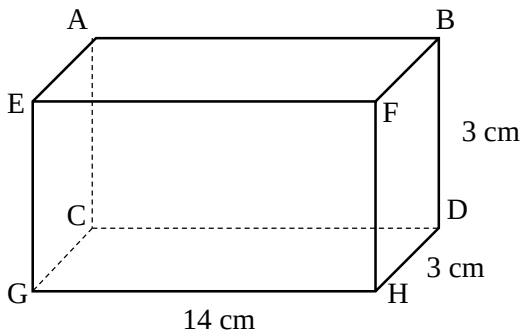
(b) Work out an estimate for the fraction of dogs that have a mass between 10 kg and 25 kg.

.....

**(2)**

**(Total for Question 14 is 5 marks)**

**15** The diagram shows a cuboid.




Calculate the size of angle BGD.
Give your answer to 3 significant figures.

.....°

**(Total for Question 15 is 4 marks)**

**16** There are 5 girls and 3 boys who regularly attend debating club.

The school must select two of the students to attend a debating competition.

The school randomly selects two students from the debating club to attend the competition.

Work out the probability that the pair selected contains one girl and one boy.

.....

**(Total for Question 16 is 4 marks)**

**17** A sample of 2,000,000 bacteria is put into a Petri dish.
A chemical is added to the Petri dish that causes the bacteria to die.
The number of bacteria in the sample $n$ minutes after the chemical was added is $b_n$

The number of bacteria in the sample $(n+1)$ minutes after the chemical was added, $b_{n+1}$, is given by

$$b_{n+1} = K \times b_n \text{ where } K \text{ is a constant.}$$

The chemical was added to the Petri dish at 10:30 am.
At 10:32 am the number of bacteria in the sample was 1,548,800.

Work out the number of bacteria in the sample at 10:33 am.

.....

**(Total for Question 17 is 4 marks)**

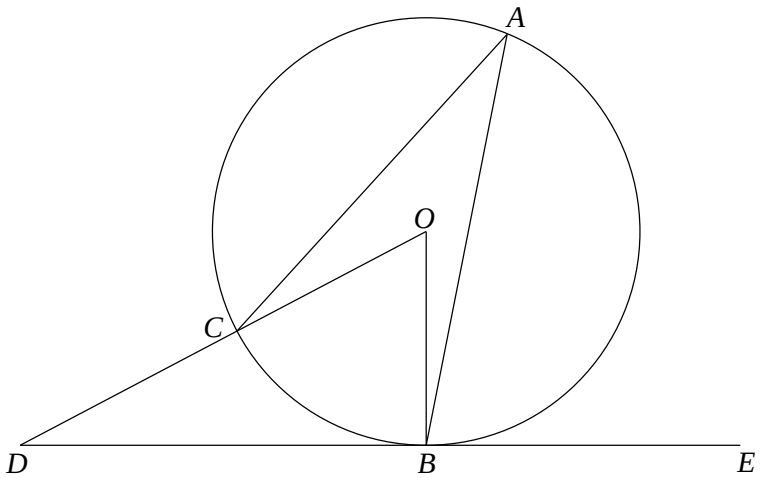
**18** $125^3 \times 25^{(x+1)} = 5^{20}$

Find the exact value of $x$.

.....

**(Total for Question 18 is 3 marks)**

**19**




*A*, *B* and *C* are points on the circumference of a circle, centre *O*.
*DBE* is a tangent to the circle.

Angle *ODB* = 18°

(a) Work out the size of angle *CAB*.
You must show all your working.

..... °

**(2)**

*DE* = 36 cm
*DB* : *BE* = 5 : 4

(b) Work out the length of line CD.
Give your answer to three significant figures.

..... cm

**(4)**

**(Total for Question 19 is 6 marks)**

**20** Show that $5x^{-2} + \frac{x^2 - 9}{x^2 + x - 12} \times \frac{x + 4}{2x^3 + 6x^2}$ can be written in the form $\frac{a}{bx^2}$ where $a$ and $b$ are integers

**(Total for Question 20 is 5 marks)**

**21** Solve algebraically the simultaneous equations.

$y = 2x^2 + 30x + 61$
$y = 1 - 4x$

.....

**(Total for Question 21 is 5 marks)**

**TOTAL FOR PAPER IS 80 MARKS**