Mock Exam
Applications of Mathematics
Paper 1 (Non Calculator)

N5 National Qualifications

Duration − 50 minutes

Fill in these boxes and read what is printed below.

Full name of centre

SOLUTIONS

Town

Forename(s)

Surname

Number of seat

Date of birth

Day	Month	Year	Scottish candidate number

Total marks − 35

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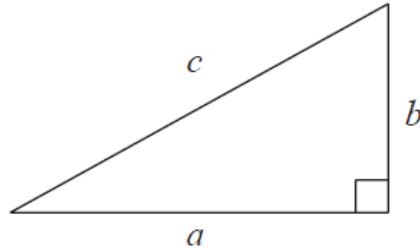
Use **blue** or **black** ink.

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.

FORMULAE LIST

Circumference of a circle	$C = \pi d$
Area of a circle	$A = \pi r^2$

Theorem of Pythagoras

$$a^2 + b^2 = c^2$$

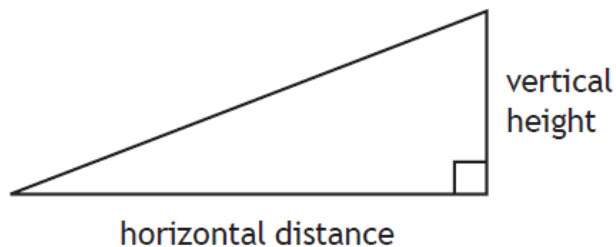|	
Volume of a cylinder	$V = \pi r^2 h$
Volume of a prism	$V = Ah$
Volume of a cone	$V = \frac{1}{3}\pi r^2 h$
Volume of a sphere	$V = \frac{4}{3}\pi r^3$

Standard deviation

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

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

Gradient

$$\text{gradient} = \frac{\text{vertical height}}{\text{horizontal distance}}$$

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Total marks — 35

Attempt ALL questions

MARKS

1. Allistair has to travel 150 miles for a work meeting.
The diagram below shows how much fuel is currently in his car.
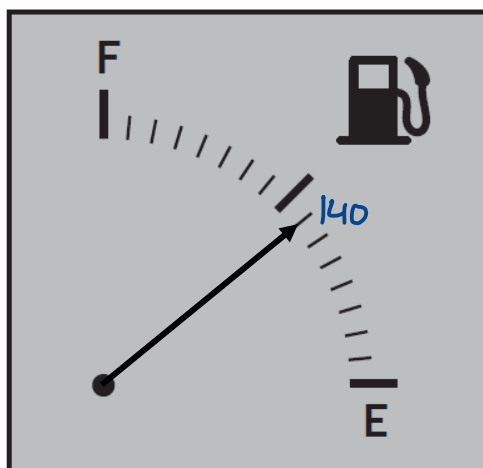
When the car is completely filled, there is enough fuel to travel 320 miles.

Allistair thinks he has enough fuel for his journey.
Determine whether he is correct. **2**

There is enough fuel to travel 140 miles, ✓₁
therefore Allistair is incorrect since 140 < 150. ✓₂

2. At a meeting, employees have the option of a cup of tea, a cup of coffee or a glass of water.

- $\frac{2}{9}$ of the employees asked for a cup of tea

- $\frac{3}{8}$ of the employees asked for a cup of coffee

- the rest of employees asked for a glass of water.

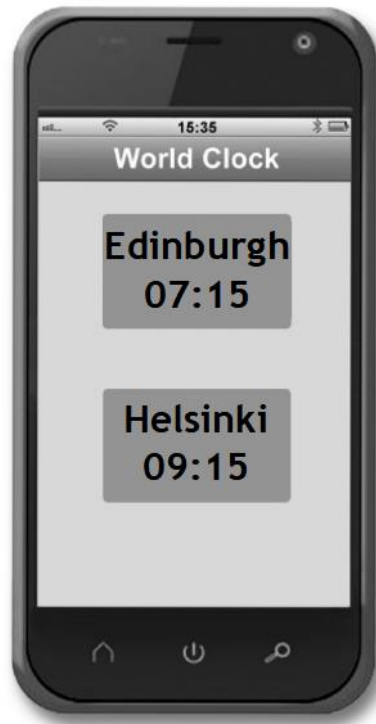Calculate the fraction of employees who asked for a glass of water. **3**

$$\frac{2}{9} + \frac{3}{8} = \frac{16}{72} + \frac{27}{72} \checkmark_1 = \frac{43}{72} \checkmark_2$$

$$\therefore \frac{29}{72} \text{ asked for water. } \checkmark_3$$

[Turn over

3. Vicki is in Helsinki on holiday.
    She looks at the World Clock app on her phone and sees the following:

    15:35
    World Clock

    Edinburgh
    07:15
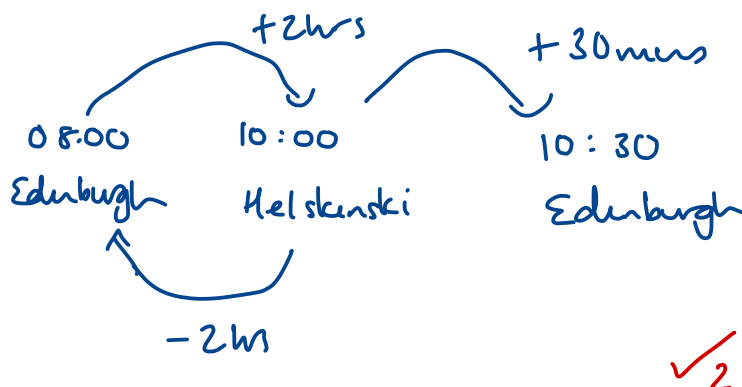
    Helsinki
    09:15

    Her flight to Edinburgh departs Helsinki at 10:00 local time.
    The flight time is 2 hours and 30 minutes.

    Vicki books her taxi at Edinburgh airport for 11:00 local time.
    Determine whether Vicki will be on time for her taxi.   **2**

Edinburgh is 2 hours ✓ behind Helsinki.

+2hrs
+30mins
08.00   10:00   10:30
Edinburgh Helsinki Edinburgh
−2hrs

✓2

Vicki will be on time for her taxi
(half an hour early).

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4. Jamie works as a cashier in a supermarket.

His basic wage is £7.40 per hour. His overtime rate is time-and-a-half.

In a given week, Jamie completes 40 hours basic plus **10 hours overtime**.

Each week he pays £28·43 Income Tax and £8·57 in National Insurance.

(a) Calculate his take home pay for this week. **3**

Basic pay
7.40 × 40
= £296 ✓₁

7.40
× 4
29.60

overtime
11.10 × 10
= £111 ✓₂

7.40 ÷ 2
= 3.70

7.40 + 3.70 = £11.10

deductions
28.43 + 8.57
= £37

take home pay
296 + 111 − 37
= £370 ✓₃

Jamie is going on holiday in 7 weeks. The holiday costs £650 and he wants to take £350 spending money.

Jamie makes a table to show his weekly income and outgoings.
He puts any leftover money into his holiday fund.

	Income	Outgoings
Take home pay	£370	
Rent		£76
Bills		£41
Food		£45
Entertainment		£30
Transport		£23
Holiday Fund		£155

} £215

(b) Determine whether Jamie will have enough money to cover the cost of the holiday and his spending money.

Justify your answer by calculation. **2**

total cost of holiday
= 650 + 350
= £1000 ✓₄

155
× 7
£ 1085

Yes, he will have £85 extra.

✓₅

[Turn over

page 5

5. Sanja is washing the dishes.

The table below shows list of tasks and time taken to complete the task.

Activity	Description	Preceding task	Time (minutes)
A	Turn on the water heater	None	5
B	Put away previously dry plates	None	2
C	Turn on water tap to fill the sink	D	3
D	Put plug into sink	A	1
E	Collect dirty dishes	B	2
F	Add washing up liquid	C	1
G	Wash dishes	F, E	15
H	Leave to dry	G	10

(a) Complete the diagram below to show the tasks and times in the boxes. **2**

A S | D 1 | C 3 | F 1 ✓1

G 15 | H 10 ✓2

B 2 | E 2
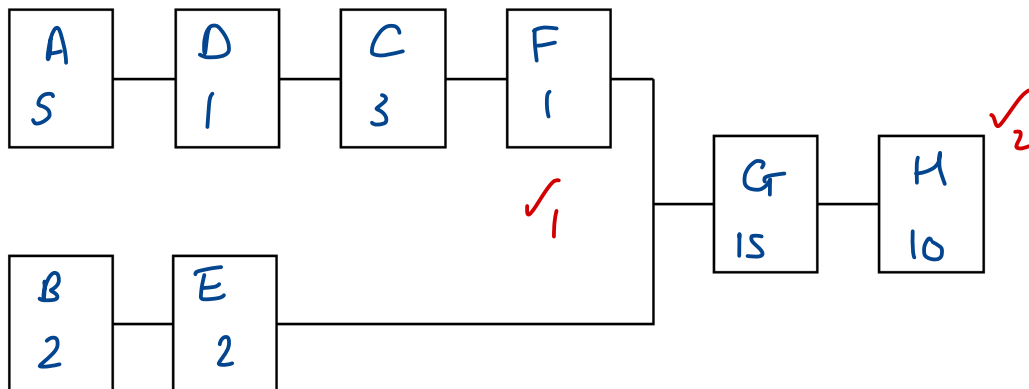
Sanja thinks that if she starts washing the dishes at 5.45 pm, she will finish by 6.15 pm.

(b) Based on the times given, determine if Sanja is correct. **2**

$5 + 1 + 3 + 1 + 15 + 10 = 35$ mins ✓3

5:45pm +35mins 6:20pm

No, it will take her 5 mins longer. ✓4

[Turn over

page 6

6. At the end of the week, staff in a school can order a free coffee.

They can choose from a latte, cappuccino or mocha.

(a) The total number of coffees ordered is split in the ratio 4 : 7 : 9.

There are 12 lattes on order.

Calculate the total number of coffees ordered. **2**

L : C : M

4 : 7 : 9

×3 (12 : 21 : 27) × 3

total = 60.

The temperature of each coffee should be 70 °C ± 10%.

The temperatures, to the nearest degree Celsius, of ten of these coffees are recorded.

70　80　78　75　69　63　67　79　71

(b) State the maximum and minimum acceptable temperatures and calculate the fraction of coffees which are at an acceptable temperature. **3**

10% of 70 = 7

Min = 63°C

Max = 77°C

$\frac{6}{9}$ are at an acceptable temperature.

$\left(or \ \frac{2}{3} \right)$

[Turn over

page 7

7. Stirling FC record their ball possession (%) over their first 12 games of the season.

   The data for the first 12 games are listed below.

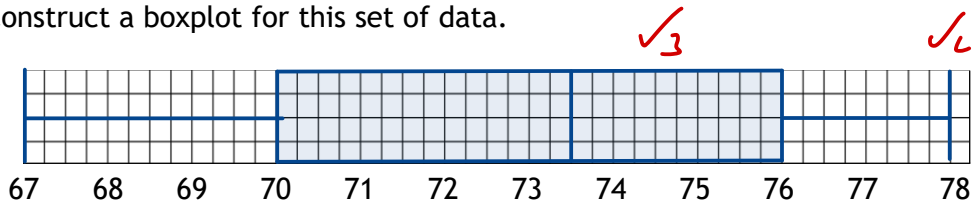   70   68   73   70   67   78   74   73   74   76   78   76

   (a) For this data, calculate:

   - the median   = 73·5 ✓1
   - the lower quartile = 70 ✓2
   - the upper quartile. = 76

   2

   $\left[\begin{array}{cccccc} 67 & 68 & 70 & 70 & 73 & 73 \end{array}\right]\left[\begin{array}{cccccc} 74 & 74 & 76 & 76 & 78 & 78 \end{array}\right]$

   (b) Construct a boxplot for this set of data.   ✓3   ✓4   **2**

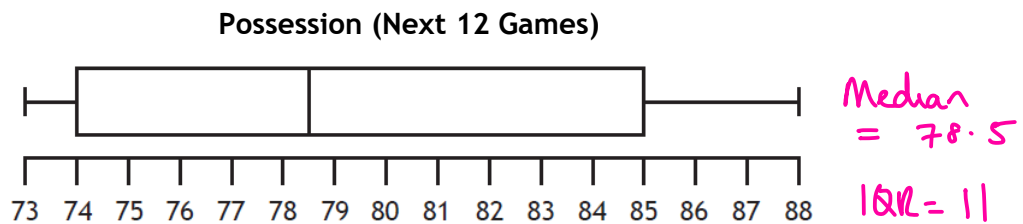 | | | | | | | | | | | | |
   67   68   69   70   71   72   73   74   75   76   77   78

   (c) Calculate the interquartile range for the first 12 league games.   **1**

   76 − 70 = 6 ✓5

   The boxplot shows the ball possession for the next 12 games.

   Possession (Next 12 Games)

   73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88

   Median = 78·5

   IQR = 11

   (d) Make one valid comment comparing the ball possession in the first 12 games and the next 12 games.   **1**

   - On average, the ball possession is higher in the next 12 games (or equivalent).

   OR

   - The ball possession in the next 12 games is more spread out (or equivalent). ✓6

8. Two dice are rolled simultaneously.

The numbers on the dice are **added together**.

Calculate the probability of rolling a number which is less than 9 but greater than 5.   3
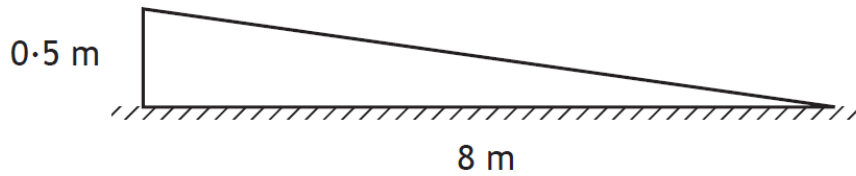
	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

$\checkmark_1$

$\checkmark_2$

$$\frac{16}{36} \left(= \frac{8}{18} = \frac{4}{9} \right)$$

$\checkmark_3$

[Turn over

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9. A ramp is being built to access a garden.

0·5 m

8 m

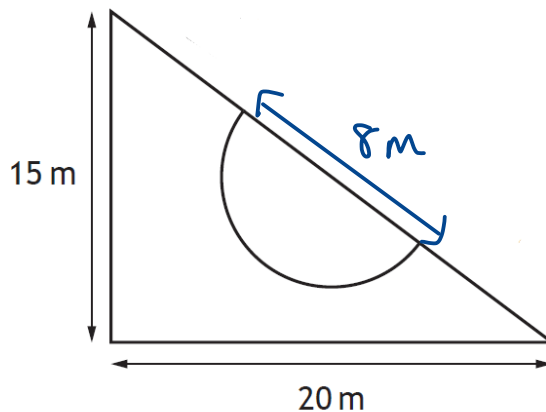(a) Calculate the gradient of the ramp.

Give your answer as a fraction in its simplest form. **2**

$$M = \frac{0·5^{×2}}{8_{×2}} = \frac{1}{16}$$

The garden is in the shape of a right-angled triangle with a semi-circular flower bed as shown below.

15 m

8 m

20 m

The garden, excluding the flower bed, will be covered with grass.

The diameter of the flower bed is 8 metres.

(b) Calculate the area to be covered with grass. **3**

Triangle

$A = \frac{1}{2} \times 20 \times 15$

$A = 150m^2$ ✓₁

Semi circle

$A = 3·14 \times 4^2 \div 2$

$A = 3·14 \times 16 \div 2$

$A = 3·14 \times 8$

$A = 25·12m^2$ ✓₂

Total

$150 - 25·12$

$= 124·88m^2$ ✓₃

$$\begin{array}{r} 3·14 \\ \times \quad 8 \\ \hline 25·12 \\ {\scriptstyle 1 \quad 3} \end{array}$$

[END OF QUESTION PAPER]

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ADDITIONAL SPACE FOR ANSWERS