FOR OFFICIAL USE

N5

National Qualifications 2025

Mark

X844/75/01

Applications of Mathematics Paper 1 (Non-calculator)

FRIDAY, 16 MAY

9:00 AM – 9:50 AM

X8447501

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 — 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.

SQA ©

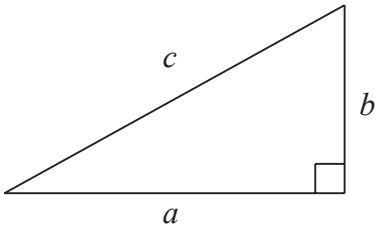
X8447501 01

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 $V = Ah$

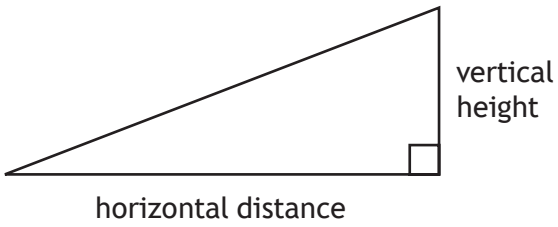
Volume of a cone $V = \frac{1}{3}\pi r^2 h$

Volume of a sphere $V = \frac{4}{3}\pi r^3$

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

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

Gradient



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

Total marks — 35

Attempt ALL questions

1. At a school, pupils voted to elect a head prefect.

- Fraser received $\frac{3}{8}$ of the votes.
- Gracie received $\frac{1}{5}$ of the votes.
- Alison received the rest of the votes.

Calculate the fraction of the votes that Alison received. **3**

[Turn over

2. Laura is buying a picture.

She looks on 3 websites to find the best deal.

Website A	**Website B**	**Website C**
Picture £21.50	Picture £35	Picture £30
	Offer: 30% off all pictures	Offer: $\frac{1}{4}$ off all pictures
Postage £3.49	Postage Free	Postage £2.80

Determine the website which offers the best deal to buy the picture and get it posted to Laura.

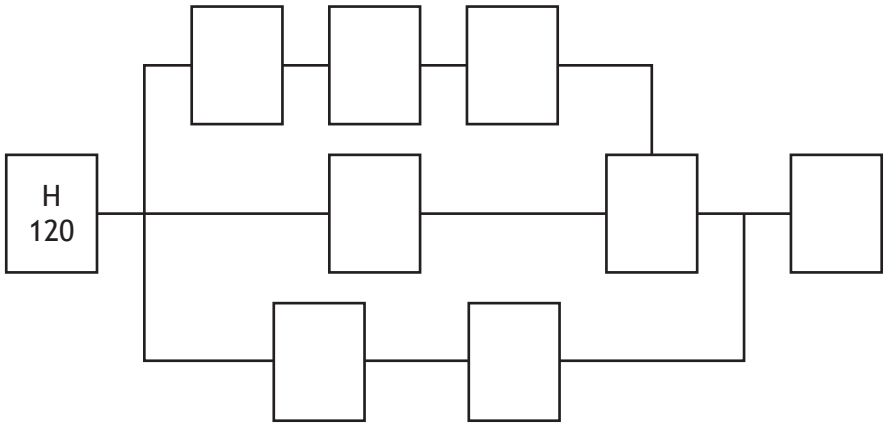
Use your working to justify your answer. **3**

3. A company produced the following table to show all the tasks involved in manufacturing and packaging chocolate eggs.

Activity	Description	Preceding activity	Time (seconds)
A	Melt chocolate and stir ingredients	H	600
B	Wrap the egg	C, I	30
C	Cool the chocolate	D	1800
D	Pour chocolate into egg mould	A	105
E	Construct the cardboard box	G	60
F	Place wrapped egg into box	B, E	45
G	Print cardboard	H	240
H	Collect materials and ingredients	none	120
I	Print foil	H	180

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

(An additional diagram, if required, can be found on *page 13*.)



(b) Calculate the minimum time taken to manufacture and package a chocolate egg. **1**

4. Harris recorded the time, in minutes, that it took him to drive to work over eight days.

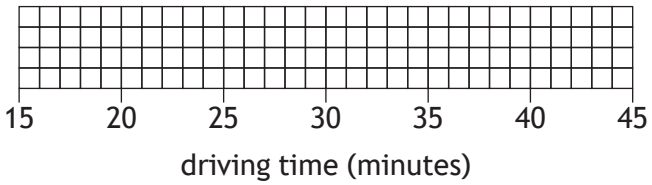
22 21 37 25 32 28 36 24

(a) For this data, calculate:

- the median
- the lower quartile
- the upper quartile. **2**

(b) Construct a box plot for this set of data.

(An additional diagram, if required, can be found on *page 13*.) **2**



(c) Calculate the interquartile range for the number of minutes it took Harris to drive to work. **1**

His colleague Lewis also recorded the number of minutes it took him to drive to work over eight days.

The interquartile range for the number of minutes that Lewis took is 9 minutes.

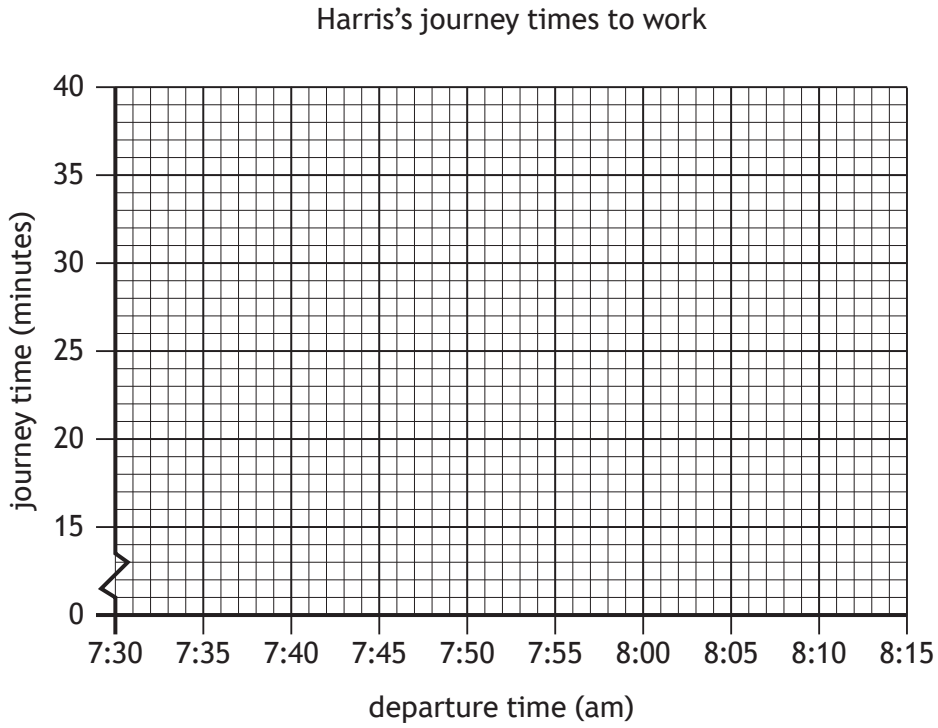
(d) Make one valid comment comparing the number of minutes Harris and Lewis took to drive to work. **1**

4. (continued)

Harris noticed that his journey times were affected by the time he departed.
The table shows his journey time in minutes.

Departure time (am)	7:32	7:36	8:10	7:40	8:02	7:50	8:04	7:45
Journey time (minutes)	22	21	37	25	32	28	36	24

(e) On the grid below draw a scattergraph to show this data. **2**
(An additional diagram, if required, can be found on *page 14*.)



(f) Draw a line of best fit on your scattergraph. **1**

(g) Tomorrow, Harris plans to depart at 7:55 am. Use your line of best fit to estimate his journey time. **1**

5. Julie scored 78% in her science test.

She also scored 32 out of 40 in her maths test.

Determine which subject she performed better in.

Justify your answer. **2**

6. Ramani works as a sales person for a car company.

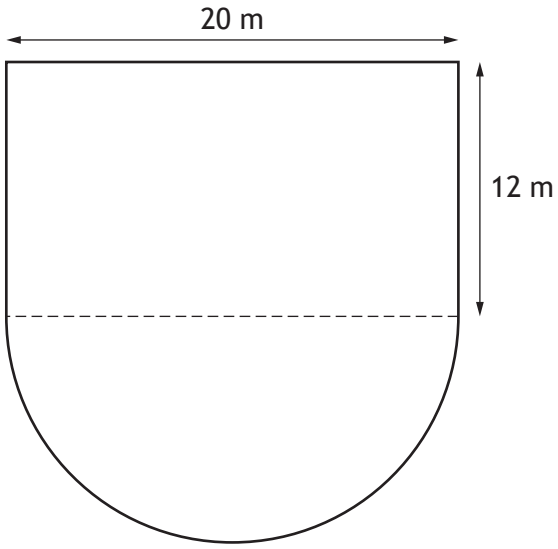
She is paid a basic monthly salary of £1870 plus commission of 3% on her monthly sales **over** £58,000.

In April, her sales totalled £96,000.

Calculate Ramani's gross pay in April. **2**

7. A school is designing a playpark.

It is in the shape of a rectangle and a semi-circle.



(a) Calculate the area of the playpark.

Take $\pi = 3.14$ **2**

The school plans to cover some of the playpark with bark.

- They plan to cover 81 m^2 with bark.
- 1 bag of bark covers 5 m^2.
- 1 bag of bark costs £8.

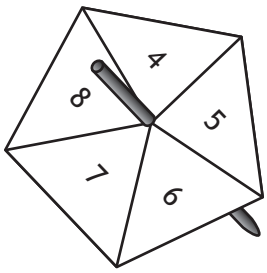
(b) Calculate the cost of the bark. **2**

8. Lesley ran a game stall at her local gala.

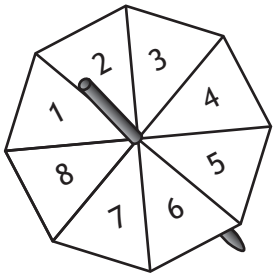
The game requires two spinners to be spun and allowed to come to rest.

The spinners are fair and are shown below.

To win a prize, spinner B must land on **a larger number** than spinner A.



spinner A



spinner B

(a) Calculate the probability of winning a prize. **3**

8. (continued)

Catriona runs a **different** game at the gala.

Players who win receive a £5 prize.

When playing this game, the probability of a player winning a prize is 0.15.

The game was played 80 times.

Catriona gave out a total of £70 in prizes.

(b) Determine if this is more or less than expected. **3**

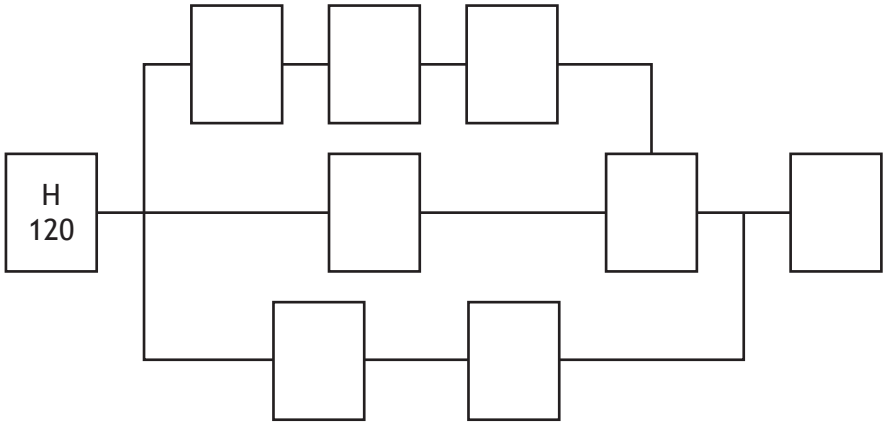
[Turn over

9. A farm has 3 different types of animal.
It has sheep, pigs and cows in the ratio 9:7:4 respectively.
There are 180 **more** sheep than there are cows.
Calculate the total number of animals on the farm. **2**

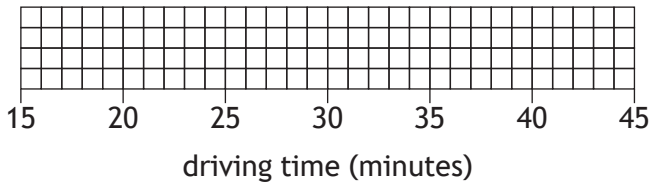
[END OF QUESTION PAPER]

ADDITIONAL SPACE FOR ANSWERS

Additional diagram for use with question 3 (a)



Additional diagram for use with question 4 (b)



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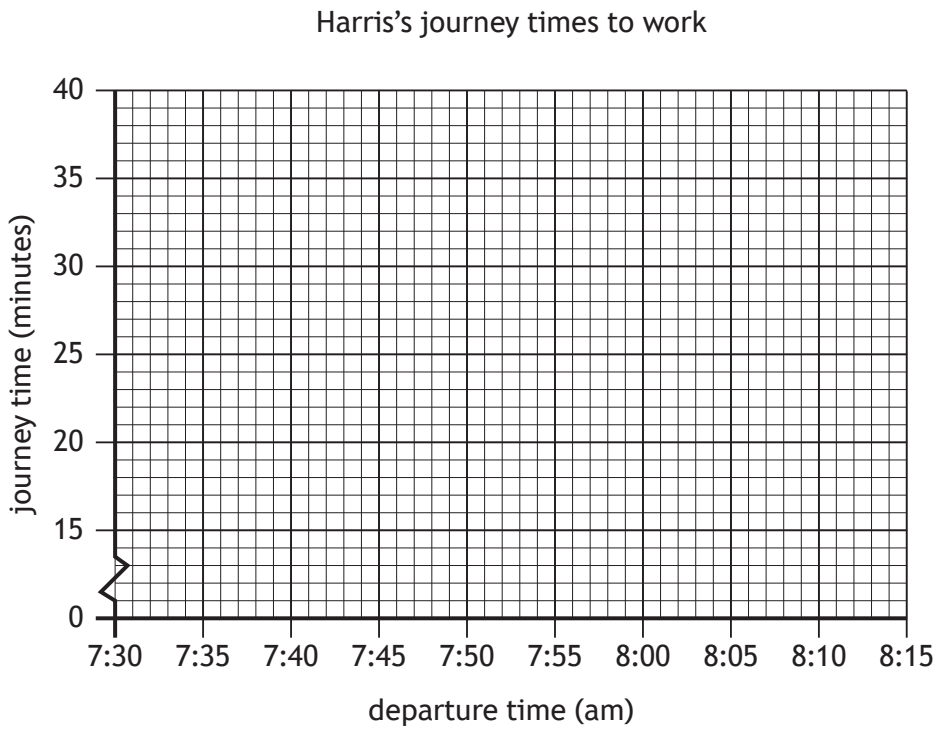
Additional diagram for use with question 4 (e)



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ADDITIONAL SPACE FOR ANSWERS

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X844/75/02

Applications of Mathematics Paper 2

FRIDAY, 16 MAY

10:20 AM – 12:00 NOON

X8447502

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Surname

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Day | Month | Year

Scottish candidate number

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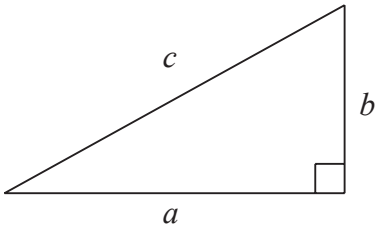

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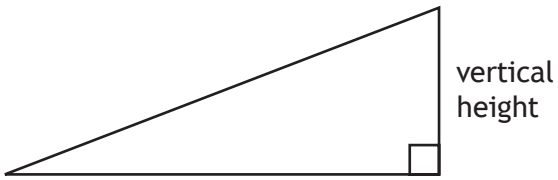


$$\text{gradient} = \frac{\text{vertical height}}{\text{horizontal distance}}$$

Total marks — 55

Attempt ALL questions

1. A Body Mass Index (BMI) is calculated using mass in **kilograms** and height in **metres**.

It is calculated using the formula:

$$\text{BMI} = \frac{\text{mass}}{\text{height}^2}$$

A patient's mass is 93.5 **kilograms** and their height is 182 **centimetres**.

Calculate the BMI of the patient. **2**

2. Ayesha earns an annual salary of £46,900.

Following a pay deal, it is agreed that her annual salary will increase by 1.7% in each of the following 3 years.

Calculate Ayesha's annual salary after 3 years.

Give your answer rounded to 3 significant figures. **4**

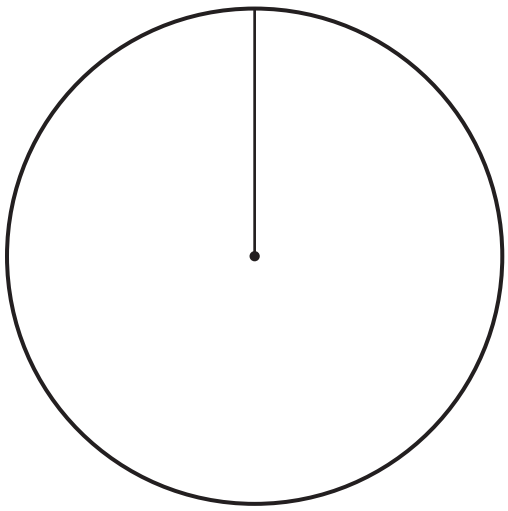
[Turn over

3. Alastair works in a factory that makes chocolate.
He carried out a survey to determine the preferred type of chocolate.
The results are shown.

Type of chocolate	Number of people
White	20
Milk	34
Dark	26

Construct a pie chart to illustrate this information.
(An additional diagram, if required, can be found on *page 18*.) **3**

preferred type of chocolate



4. Allana earns £800 gross pay per week.

National Insurance is calculated on a person's pay before deductions such as pension contributions.

National Insurance rates per week	
Up to £242	0%
From £242 to £967	8%
Over £967	2%

(a) Calculate Allana's weekly National Insurance payment. **2**

Allana pays 7.5% of her gross pay into her pension.

Allana's weekly income tax is £92.06.

(b) Calculate Allana's weekly net pay. **2**

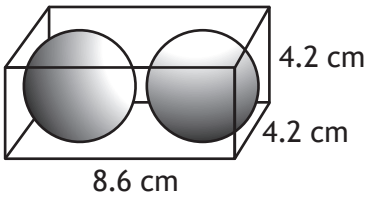
[Turn over

5. A sports company sells squash balls.

The balls are in the shape of a sphere with a diameter of 4 cm.

They are sold in cardboard boxes in the shape of a cuboid with dimensions as shown.

Each box contains 2 squash balls.

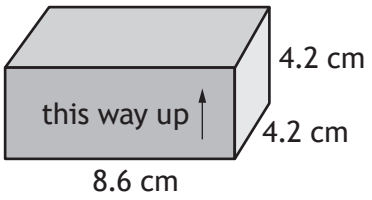


(a) Calculate the volume of empty space in the box. **4**

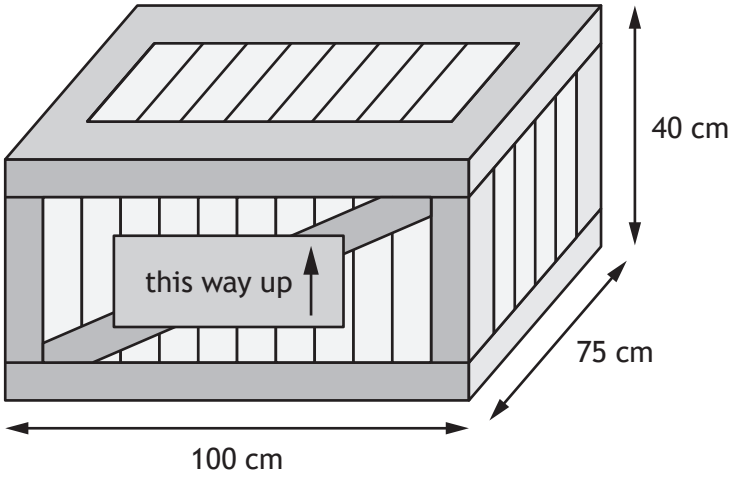
5. (continued)

The boxes are packed into crates for transportation.

The boxes must be aligned in the same direction.



The internal dimensions of a crate are shown.



(b) Calculate the maximum number of boxes that can be packed into a crate. **3**

[Turn over

5. (continued)

The company looked at the length of squash matches.

A sample of times, in minutes, for **professional** matches are shown.

52 68 45 52 58

For these times, calculate:

(c) (i) the mean **1**

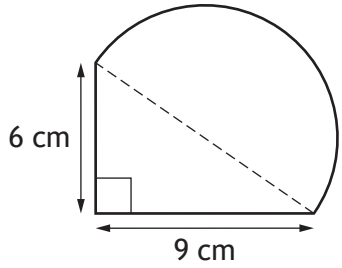
(ii) the standard deviation. **3**

The mean length of time for an **amateur** match is 42 minutes and standard deviation is 17.2 minutes.

(d) Make two valid comments comparing the length of professional matches with amateur matches. **2**

6. A badge has been designed in the shape of a right-angled triangle and a semi-circle.

The outside edge of the badge will be made of silver.



Calculate the length of silver needed for the outside edge of the badge. **4**

[Turn over

7. James travelled from Southampton to New York by ship.
It took 180 hours to sail from Southampton to New York.
The local time in New York is 5 hours behind the local time in Southampton.
The ship arrives in New York at 04:00 on 18 November.

(a) Calculate the date and local time that the ship left Southampton. **3**

7. (continued)

James spent time in New York then travelled to Toronto, Canada.

Rate of exchange	
Pounds sterling (£)	US dollars
1	1.28

- James changed £1500 into US dollars.
- He spent an average of 130 US dollars each day for 7 days.
- He changed his remaining US dollars into Canadian dollars.
- He received 1363.50 Canadian dollars.

(b) Calculate the rate of exchange for US dollars into Canadian dollars.

Rate of exchange	
US dollars	Canadian dollars
1	?

3

[Turn over

8. The start of an orienteering course is being planned.

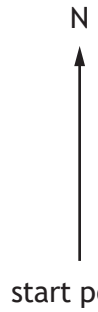
Competitors leave the start point and run on a bearing of 335° for 400 metres to checkpoint A.

From checkpoint A they then run on a bearing of 030° for 320 metres to checkpoint B.

Construct a scale drawing to illustrate this part of the course.

Use a scale of 1 cm : 100 m.

(An additional diagram, if required, can be found on *page 19*.) **3**



9. McKay Marketplace is a grocery shop.

All tills in the shop have a weighing scale.

An object weighing 800 grams is placed on the scale.

Regulations say the scale should display a reading of 800 grams $\pm 0.05\%$.

The scale displayed a reading of 800.6 grams.

(a) Determine if the reading met the regulations. **2**

The shop sells lemonade.

There are two options.

- Option A — 24 pack of 250 ml cans of lemonade cost £7.50.
- Option B — 10 pack of 330 ml cans of lemonade cost £3.89.

(b) Determine which option offers the best value for money. **2**

[Turn over

9. (continued)

At Christmas the shop puts up decorations.
Last Christmas it took 6 workers 5 hours to decorate the shop.
This Christmas there are 8 workers available to complete the same task.
All workers decorate at the same rate.

(c) Calculate how long it will take to decorate the store.
Give your answer in hours and minutes. **2**

Freya works for McKay Marketplace.
She is contracted to work 35 hours each week.
Her basic hourly rate of pay is £10.60.
She is paid **double time** for any overtime she works.
Last week she worked 39.5 hours.

(d) Calculate her gross pay for last week. **2**

10. Andy runs 3.4 miles in a time of 33 minutes.

(a) Calculate Andy's average speed.
Give your answer in **kilometres per hour**.
1 mile = 1.609 km **3**

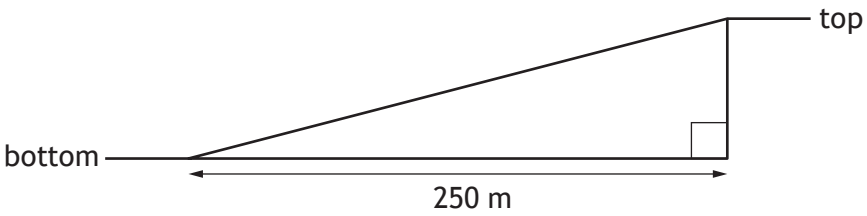
[Turn over

10. (continued)

To improve his fitness Andy wants to complete hill sprints.

The hill closest to his house has the following measurements:

- The horizontal distance between the top and the bottom of the hill is 250 metres.
- The bottom of the hill is 48 metres above sea level.
- The top of the hill is 71 metres above sea level.



His training programme states that the hill must have a gradient greater than 0.1.

(b) Determine if the gradient of this hill meets this requirement. **3**

10. (continued)

Before starting the training programme Andy could run 5.6 miles in an hour.

After completing the training programme he could run 7.2 miles in an hour.

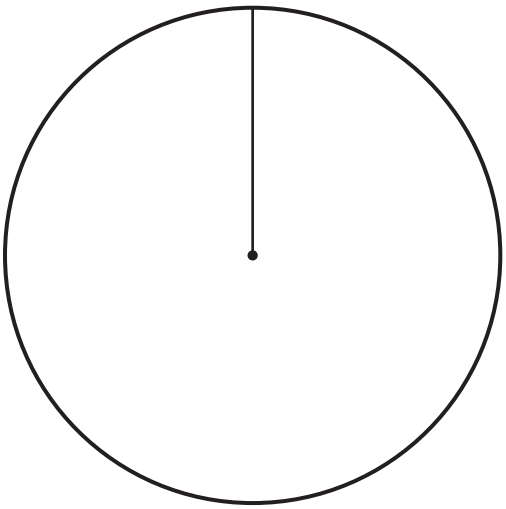
(c) Calculate the percentage increase in the distance that Andy can run in an hour after completing the training programme. **2**

[END OF QUESTION PAPER]

ADDITIONAL SPACE FOR ANSWERS

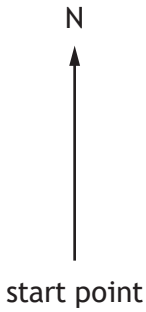
Additional diagram for use with question 3

preferred type of chocolate



ADDITIONAL SPACE FOR ANSWERS

Additional diagram for use with question 8



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ADDITIONAL SPACE FOR ANSWERS