FOR OFFICIAL USE

N5

National Qualifications 2019

Mark

X844/75/01

Applications of Mathematics Paper 1 (Non-calculator)

THURSDAY, 2 MAY

09:00 AM – 10:05 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 — 45

Attempt ALL questions.

You may 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 ©

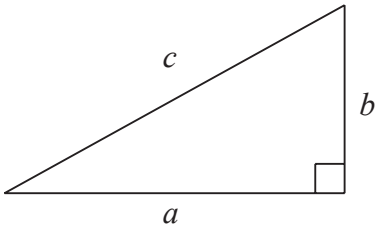
X844750101

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 $V = Ah$

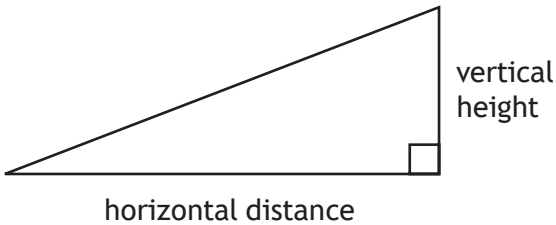
Volume of a cone $V = \frac{1}{3}\pi r^2 h$

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 — 45

Attempt ALL questions

1. Helen makes and sells candles.

These candles should be 22·5 cm tall.

She rejects any candle that is outwith the range of ± 2 mm of this height.

Below are the heights, in centimetres, of 10 candles chosen at random.

22·2, 22·6, 22·5, 22·9, 22·3, 21·6, 22·6, 22·4, 22·7, 22·8

Calculate the percentage of candles that she rejects. **3**

2. Paul usually works 30 hours each week.
He is paid time and a half for any **additional** hours that he works.
His basic rate of pay is £12·50.
Last week, he worked a total of 37 hours.

(a) Calculate his gross pay for last week. **3**

2. (continued)

Paul is buying a new TV.

It is advertised at a price of £825.

He decides to use a payment plan to buy the TV.

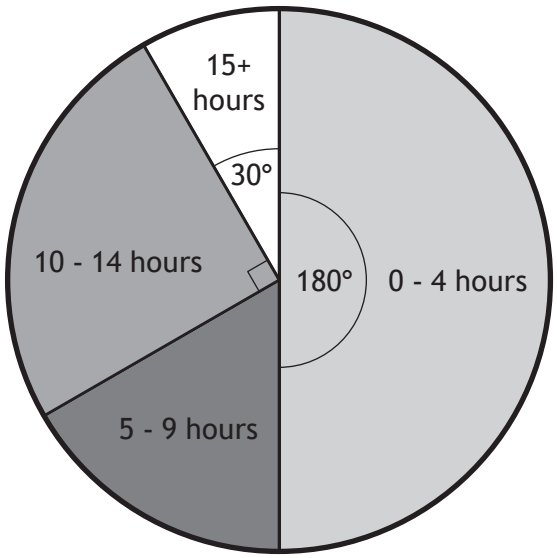
The total cost of the TV using the payment plan is £845·80.

The payments are calculated as follows

- deposit of $\frac{1}{5}$ of **advertised** price
- 8 equal monthly instalments
- final payment of £100.

(b) Calculate the monthly instalment. **3**

3. The pie chart shows the number of hours overtime that 72 employees of a supermarket worked during one month.

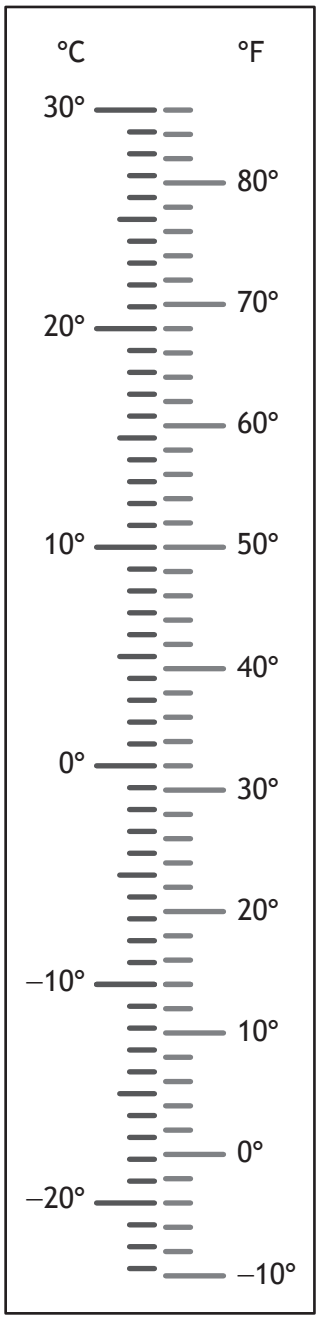


(a) Calculate how many employees worked 15+ hours overtime. **1**

(b) Calculate the probability that an employee chosen at random worked 9 or less hours overtime. **2**

4. Gillian thinks that 24 °F is colder than −3 °C.

A thermometer is shown.



Determine if she is correct.

Justify your answer. **2**

5. Allana takes out a loan of £4500.
The interest plus the administration fee is 7·5% of the loan amount.
The total amount will be paid back in 9 equal monthly payments.
Calculate the monthly payment. **3**

6. Write the following values in order from greatest to least.

$$0{\cdot}388,\ \frac{3}{8},\ 38{\cdot}38\%,\ 0{\cdot}39$$

Justify your answer. **2**

7. An airline records the number of passengers who fail to turn up for their flights each month.

The numbers for 2017 are

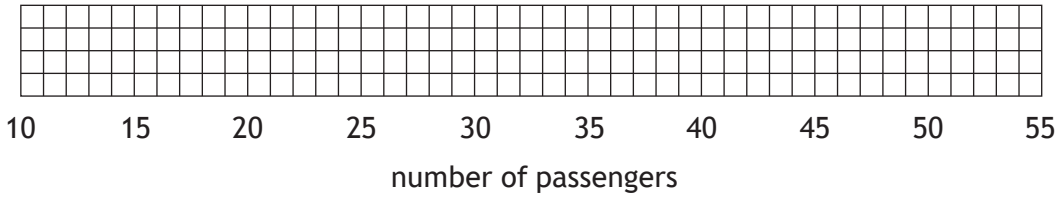
25, 14, 32, 29, 20, 43, 17, 20, 38, 27, 49, 23.

(a) For this data, calculate

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

(b) Construct a boxplot for this set of data.

(An additional grid, if required, can be found on *page 17*) **2**



(c) Calculate the interquartile range for this set of data. **1**

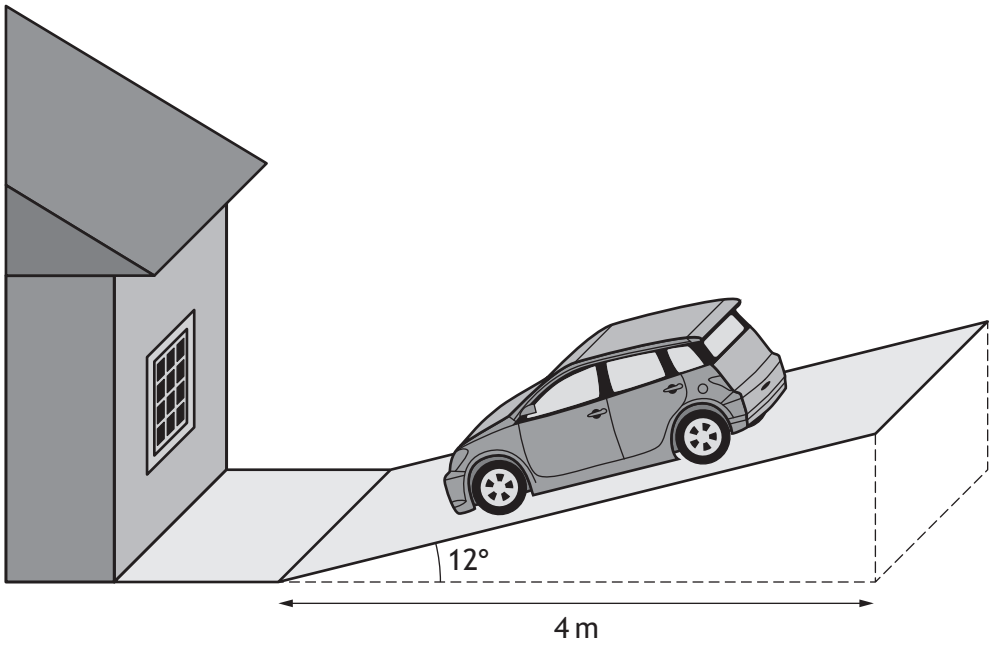
In 2016, the interquartile range for the number of passengers who failed to turn up for their flights was 17.

(d) Make one valid comment comparing the number of passengers who failed to turn up for their flights in these two years. **1**

8. Sarah's driveway is sloped as shown in the diagram below.

The cross-section of the driveway is in the shape of a right-angled triangle.

The base is 4 metres long and makes an angle of 12° with the driveway as shown in the diagram below.



(a) Construct a scale drawing of the cross-section of the driveway.

Use a scale of 1 cm : 0·5 m. **2**

8. (continued)

(b) Use your scale drawing to calculate the gradient of the driveway. **2**

9. After a meeting in Beijing, Jennifer flies home to London via Amsterdam.

The plane leaves Beijing on 3 February at 12:15 local time.

The plane lands in Amsterdam on 3 February at 18:00 local time.

Beijing is 7 hours ahead of Amsterdam.

(a) Calculate the time taken for Jennifer's flight from Beijing to Amsterdam.

Give your answer in hours and minutes. **1**

On landing in Amsterdam, Jennifer's phone tells her the time and date in the following cities.

Amsterdam, Netherlands	18:00	3 Feb
London, United Kingdom	17:00	3 Feb
Miami, United States of America	12:00	3 Feb

- Jennifer plans to telephone her brother as soon as she gets home.
- She will arrive at her home, in London, at 23:15 local time.
- Her brother lives in Miami, and arrives home from work at 17:00 local time.

(b) Determine whether her brother will be home from work when Jennifer makes the phone call.

Use your working to justify your answer. **2**

10. A basic cookie dough mix requires butter, sugar, flour and chocolate chips.

- $\frac{1}{6}$ of the mix is butter
- $\frac{1}{3}$ of the mix is sugar
- $\frac{1}{4}$ of the mix is chocolate chips
- The rest of the mix is flour

Calculate the fraction of the mix that is flour. **3**

11. Mary gave some money to four of her nieces.

It was shared **in proportion to** their ages.

Name	Age
Jane	4
Heather	11
Laura	9
Kate	6

Kate's share is £1950.

Calculate the total amount Mary gifted her nieces. **3**

12. Kieran and Gemma have each set themselves a monthly electricity allowance.

Kieran has set himself an allowance of £42.

Gemma has set herself an allowance of £49.

At the end of July, their smart meters recorded that

- Kieran had used £15 of his allowance
- Gemma had used £21 of her allowance.

Determine who had used a greater proportion of their allowance.

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

13. Joe had a business meeting in London.

He travelled from home to his meeting by car.

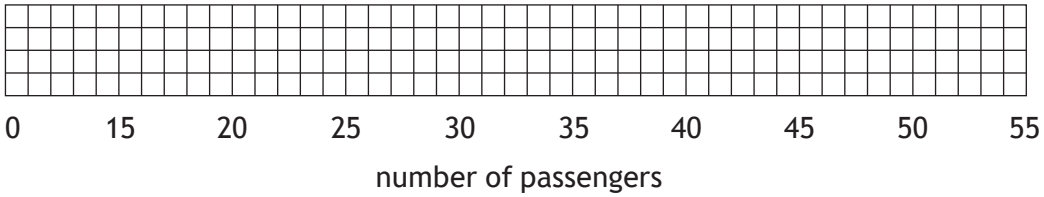
- He arrived at his meeting at 11:45
- He travelled 220 miles to his meeting at an average speed of 50 mph
- During his journey he stopped for half an hour for breakfast

Calculate the time he left home. **4**

[END OF QUESTION PAPER]

ADDITIONAL SPACE FOR ANSWERS

Additional grid for use in question 7 (b)



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ADDITIONAL SPACE FOR ANSWERS

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