

FOR OFFICIAL USE



National  
Qualifications  
2023 MODIFIED

Mark

X844/75/01

# Applications of Mathematics Paper 1 (Non-calculator)

THURSDAY, 4 MAY

9:00 AM – 9:50 AM



\* X 8 4 4 7 5 0 1 \*

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.



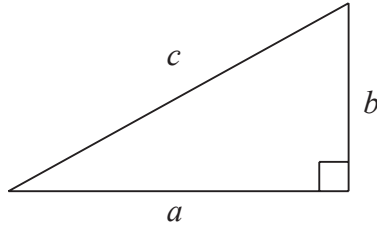
\* X 8 4 4 7 5 0 1 0 1 \*

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

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

Gradient



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



\* X 8 4 4 7 5 0 1 0 2 \*

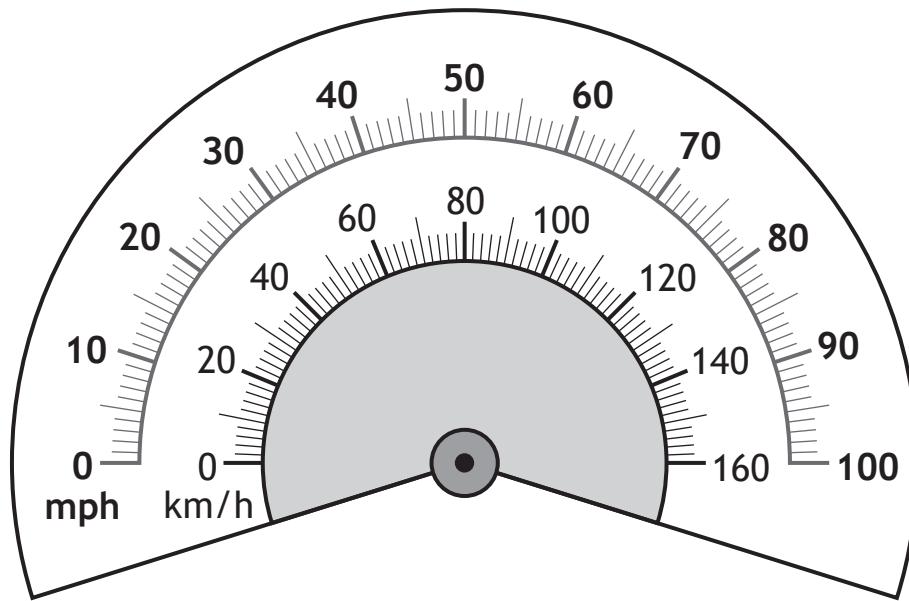
Total marks — 35  
 Attempt ALL questions

1. Josh earns £9 per hour and works 30 hours a week.  
 His weekly outgoings are £220 a week.  
 Josh saves all his remaining money.  
 He books a holiday costing £566.  
 He will take £800 spending money with him.  
 Calculate the minimum number of weeks it will take him to save the total amount. **2**

[Turn over



2. A lorry's speedometer is shown.



The lorry's speed is restricted to a maximum of 56 mph.  
 Use the speedometer to determine this speed in km/h.  
 (An additional diagram, if required, can be found on *page 17*.)

2



3. The crowd at a rugby match was made up of home supporters, away supporters and people who were neutral.

- $\frac{3}{7}$  were home supporters.
- $\frac{2}{5}$  were away supporters.
- The remaining people were neutral.

Calculate the fraction of the crowd that were neutral.

3

[Turn over

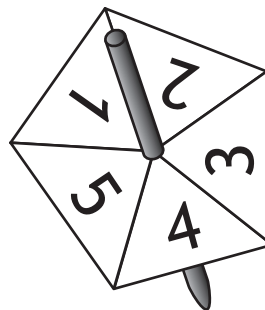
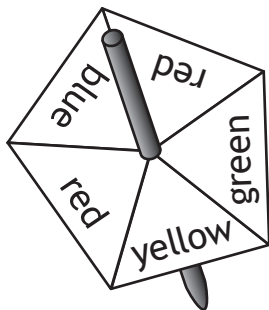


4. Geoffrey shared his savings between his three children, Sophie, Ed and Lucy. The money was shared in the ratio 7 : 2 : 6. Sophie received £3304. Calculate how much money Geoffrey gave his three children in total.

3



5. Eddie runs a stall at the school fundraiser.  
 His game requires two spinners to be spun and allowed to come to rest.  
 The spinners are shown.



A prize is won if one spinner lands on blue or green **and** the other spinner lands on an even number.

Calculate the probability of NOT winning a prize.

3

[Turn over



6. Kenny buys a new fridge.

The original price of the fridge was £650.

A shop is having a sale with 20% off the price of all fridges.

When Kenny goes to the shop, he finds there is an additional 2.5% off the sale price.

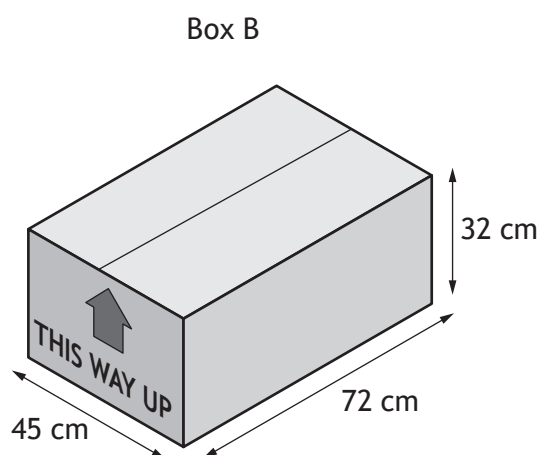
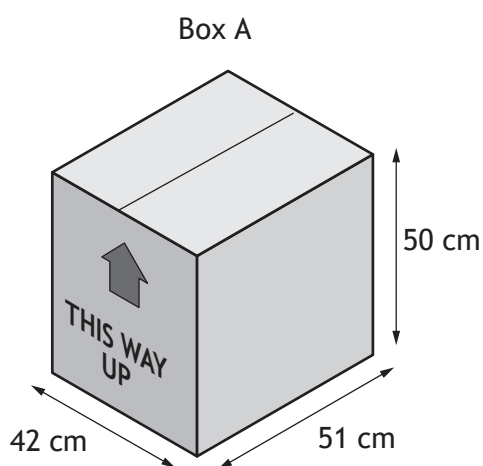
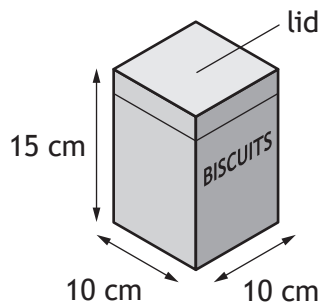
Calculate the price Kenny pays for the fridge.

3



\* X 8 4 4 7 5 0 1 0 8 \*

7. Biscuits are sold in tins in the shape of a cuboid as shown.  
 The tins need to be packed into boxes with the lid facing upwards.  
 There are two types of box available with internal measurements as shown.



Determine the maximum number of tins which can be packed.  
 Use your working to justify your answer.

2

[Turn over



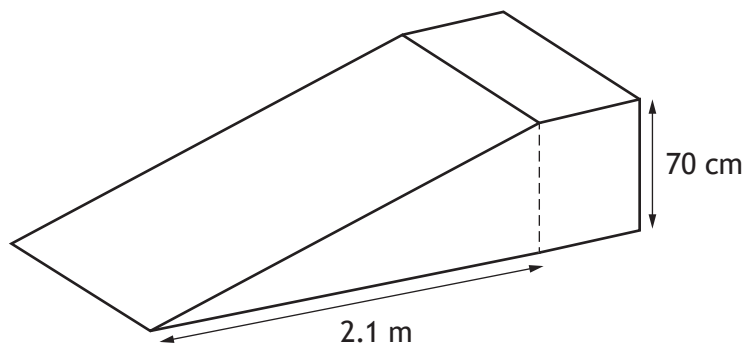
8. Janet travelled by car from her home to a meeting.  
She arrived at the meeting at 10:15 am.  
She travelled 136 miles at an average speed of 40 mph.  
During the journey she stopped for 50 minutes for breakfast.  
Determine the time Janet left home.

3



\* X 8 4 4 7 5 0 1 1 0 \*

9. A design for a skatepark ramp is shown.  
The height of the ramp is 70 cm.



To be suitable the ramp must have a gradient of  $0.35 \pm 0.01$ .  
Determine whether the ramp is suitable.  
Use your working to justify your answer.

3

[Turn over

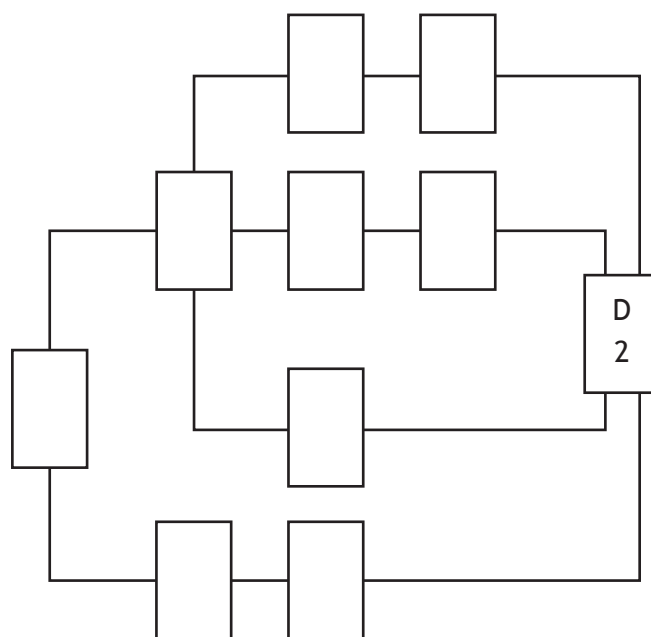


10. John owns a bike shop and has a team of mechanics who build each new bicycle. The table lists the tasks that need to be completed and the time required for each task.

Task	Detail	Preceding task	Time (minutes)
A	attach bicycle to bicycle clamp stand	F	1
B	grease pedals	A	1
C	attach wheels	A	7
D	put bike on display	G, H, I, J	2
E	grease saddle post	F	1
F	remove bicycle frame and parts from box	none	2
G	insert saddle post into frame and tighten	E	1
H	install headset	A	5
I	inflate the tyres	C	4
J	attach pedals	B	3

- (a) Complete the diagram below by writing these tasks and times in the boxes. (An additional diagram, if required, can be found on page 17.)

2



10. (continued)

John thinks that the team of mechanics will have the bike ready within 15 minutes.

(b) Determine if John is correct.

Use your working to justify your answer.

2

[Turn over



\* X 8 4 4 7 5 0 1 1 3 \*

11. A survey was conducted into favourite pie fillings.

The results were:

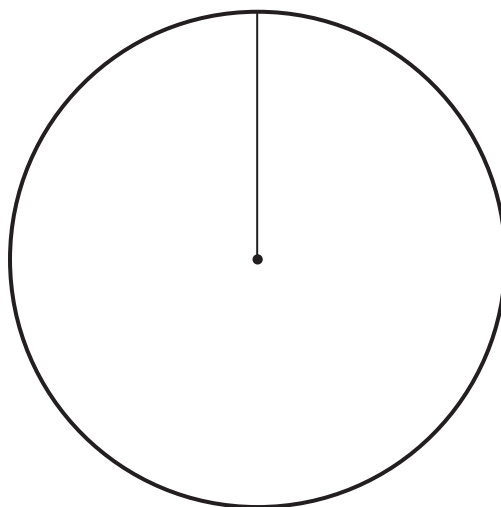
- 80 people for apple
- 40 people for cherry
- 60 people for lemon.

Construct a pie chart to illustrate this information.

(An additional diagram, if required, can be found on *page 18*.)

3

Favourite pie fillings



12. Laura makes and sells fruit smoothies.  
She intends to buy kiwi fruit in bulk.  
She considers the following two options:
- Option 1: 35 kiwi fruit for £5.95
  - Option 2: 45 kiwi fruit for £8.10
- Determine which option offers the best value for money.  
Use your working to justify your answer.

2

[Turn over



13. Senior students are preparing to sell scented candles at the school fair.

Before ordering the candles, they carried out a survey to find out which scent people preferred.

The results of the survey are shown below.

Preferred scent of candle	Linen	Vanilla	Rose	Cinnamon
Percentage of people	50%	35%	10%	5%

The students sell 180 candles in total.

They sold 65 vanilla scented candles.

Determine if this is more or less than expected.

2

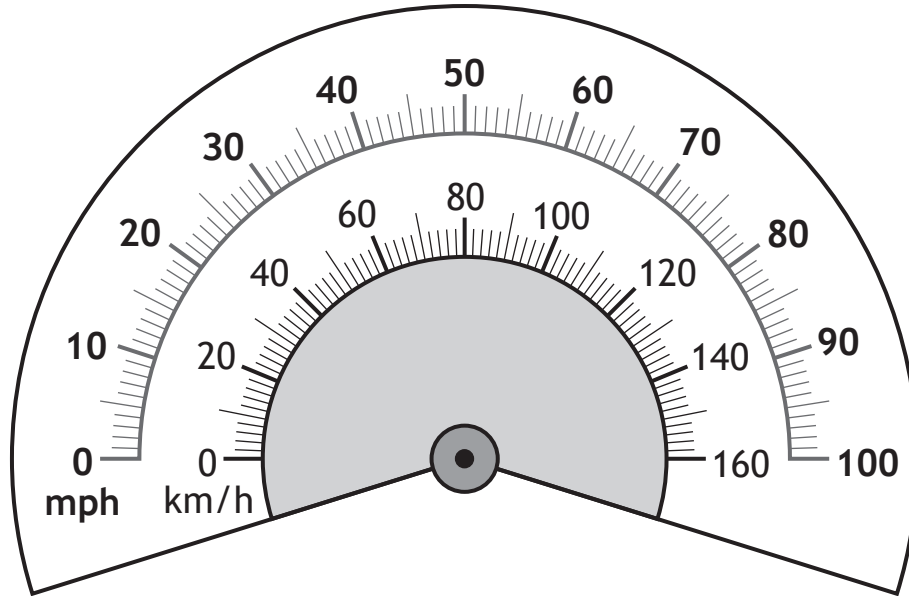
[END OF QUESTION PAPER]



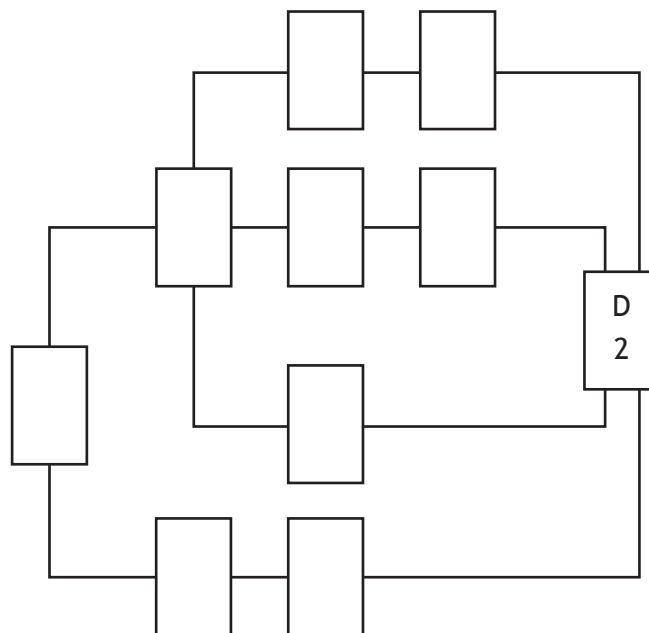
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ADDITIONAL SPACE FOR ANSWERS

Additional diagram for question 2



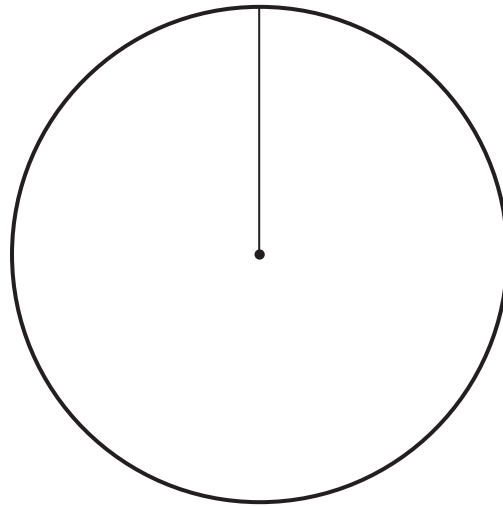
Additional diagram for question 10(a)



ADDITIONAL SPACE FOR ANSWERS

Additional diagram for question 11

Favourite pie fillings



MARKS DO NOT  
WRITE IN  
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MARGIN

ADDITIONAL SPACE FOR ANSWERS



\* X 8 4 4 7 5 0 1 1 9 \*

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