N5

National Qualifications 2017

Mark

X744/75/01

Lifeskills Mathematics Paper 1 (Non-Calculator)

MONDAY, 29 MAY
1:00 PM – 1:50 PM

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 may NOT use a calculator.

Full credit will be given only to solutions which contain appropriate working.

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 book to the Invigilator; if you do not, you may lose all the marks for this paper.
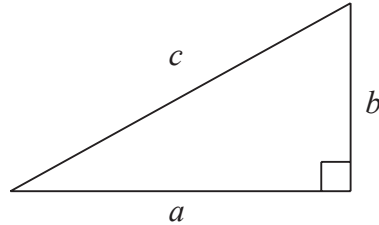
FORMULAE LIST

Circumference of a circle: $C = \pi d$

Area of a circle: $A = \pi r^2$

Theorem of Pythagoras:

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

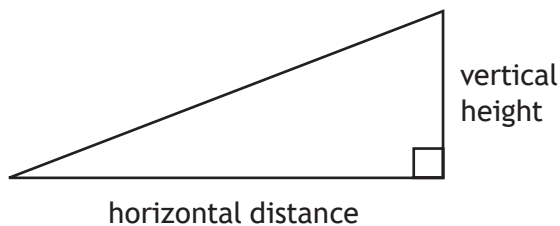Volume of a cylinder: $V = \pi r^2 h$

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: $s = \sqrt{\dfrac{\Sigma(x - \bar{x})^2}{n-1}} = \sqrt{\dfrac{\Sigma x^2 - (\Sigma x)^2/n}{n-1}}$, where n is the sample size.

Gradient:

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

vertical height

horizontal distance

1. A wall is built using foam bricks which are 194 ± 2 mm long.

The wall is 50 bricks long.

What is the minimum length of the wall? **2**

2. Anna works as a sales person for a computer company.

She is paid a basic monthly salary of £2450 plus commission of 2·5% on her monthly sales over £3000.

(a) Calculate Anna's gross salary for April when her sales totalled £9000. **3**

In her April payslip, she has the following deductions:

- Income Tax £334·67
- National Insurance £230·20
- Pension £164·74

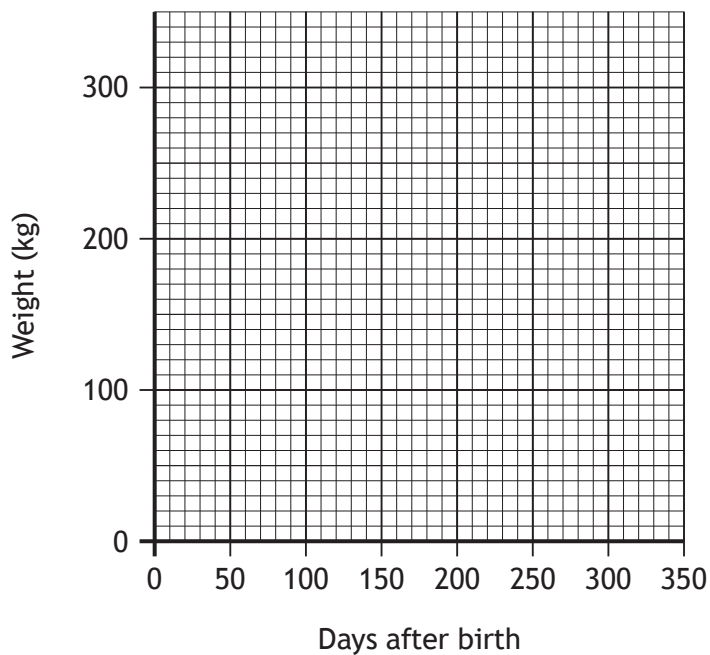(b) Calculate her net salary for April. **2**

3. Scott is a farmer.

   He records the weight of a calf from birth.

   The weight of his calf is shown in the table below.

Days after birth	0	60	120	160	200	260
Weight (kg)	40	110	130	175	220	275

   (a) On the grid below draw a scatter graph to show this data. **2**

      (An additional grid, if required, can be found on *Page 14*.)

   (b) Draw a line of best fit on the diagram above. **1**

   (c) Use your line of best fit to estimate the **age** of this calf in days when it weighed 240 kilograms. **1**
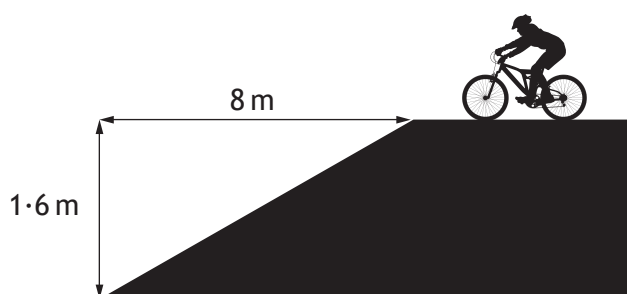
4. When classifying mountain bike trails, the gradient of the steepest section is taken into account.

Colour Grade (Difficulty)	Maximum Gradient
Green (Easy)	$\dfrac{1}{10}$
Blue (Intermediate)	$\dfrac{3}{20}$
Red (Advanced)	$\dfrac{1}{4}$
Black (Severe)	$\dfrac{1}{2}$

A new trail has been built at a mountain bike centre.

The steepest section of the new trail is shown below.
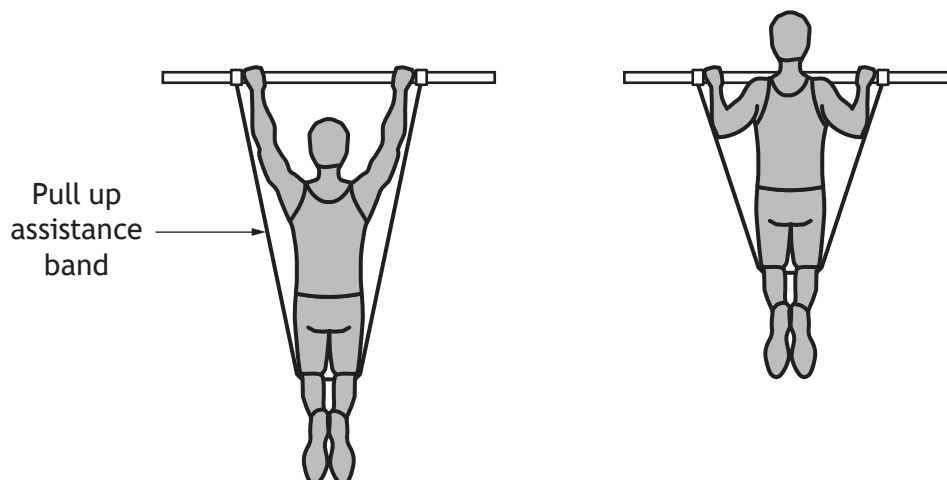
8 m

1·6 m

Can this be classified as a blue trail?

Use your working to justify your answer.

3

5. Jane is trying to improve the number of pull ups she can do.

She looks online for pull up assistance bands.

Pull up assistance band

Jane finds a table explaining which type of bands she should use based on her weight and the number of unassisted pull ups she can do.

The table is shown below.

Unassisted pull ups	Body Weight (pounds)					
	90–120	121–150	151–200	201–250	251–300	300+
0–4	D	D and A	E	F	F	G and A
5–8	C and A	D	E	E	E and B	G
9–11	C	D	D and C	E	E and A	F
12–15	C	C and B	D and B	D and C	E	E and C
16–20	B	C	D	D and B	E	E

Jane weighs herself. She is 10 stone and 1 pound.

1 stone = 14 pounds

Jane can do 3 unassisted pull ups.

(a) Which band(s) does the table recommend that Jane should buy? **1**

5. (continued)

Jane's personal trainer, Lynn, wants to buy one of each band A to G.

The recommended retail prices (RRP) of the bands are shown in the table below.

Band	Colour	RRP
A	Yellow	£2·50
B	Red	£3·90
C	Black	£8·95
D	Purple	£10·95
E	Green	£14·00
F	Blue	£17·00
G	Orange	£18·50

To buy all of the bands individually, the total RRP would be £75·80.

Lynn considers the following special offers.

Shop 1	Shop 2	Shop 3

Buy orange, blue, and green bands at RRP

Get remaining four free!

* SPECIAL *
40% OFF RRP
* OFFER *

Buy ALL bands for... £47.99

(b) Which shop offers the cheapest option for buying one of each band? **3**

   Use your working to justify your answer.

6. The mathematics teachers in a school win a lottery.

They decide to share their winnings **in proportion to** the amount they each pay per week.

They each pay the following amounts per week:

Mr Jones   £0·50
Miss Smith   £2·00
Mr Ross   £2·50
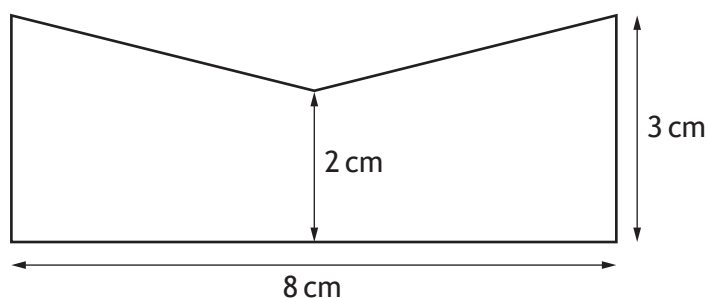Mr Young   £4·00

Mr Young's share is £2 794 000.

Calculate how much the teachers win in total.   **3**

7. Aneesa makes enamelled badges.

Each badge is made from metal.

The shape of the badge is shown below.

(a) Calculate the area of the front of each badge. **2**

The front of each badge is covered with enamel.

The enamel that Aneesa buys costs £90 for one pack.

One pack will cover 180 cm^2.

She makes as many badges as possible from one pack.

The metal that she uses costs £3 for each badge.

To make a profit, Aneesa adds an extra £17 to the cost of each badge.

(b) Calculate her selling price for each badge. **3**

8. Natalie is donating blood.

Whilst donating blood she notices a chart.

The chart states that not every blood type can be given to every patient.

The table shows which patients each blood type can help.

Blood type can be either positive (+) or negative (−).

Donor's Blood Type

Patient's Blood Type	O−	O+	B−	B+	A−	A+	AB−	AB+
AB+	✓	✓	✓	✓	✓	✓	✓	✓
AB−	✓		✓		✓		✓	
A+	✓	✓			✓	✓		
A−	✓				✓			
B+	✓	✓	✓	✓				
B−	✓		✓					
O+	✓	✓						
O−	✓							

For example the blood of a donor with blood type AB− can only be given safely to a patient with blood type AB+ or AB−.

Natalie then notices a graph showing the blood type of a random sample of **100** people in Scotland.

Blood Type of Random Sample of 100 People in Scotland
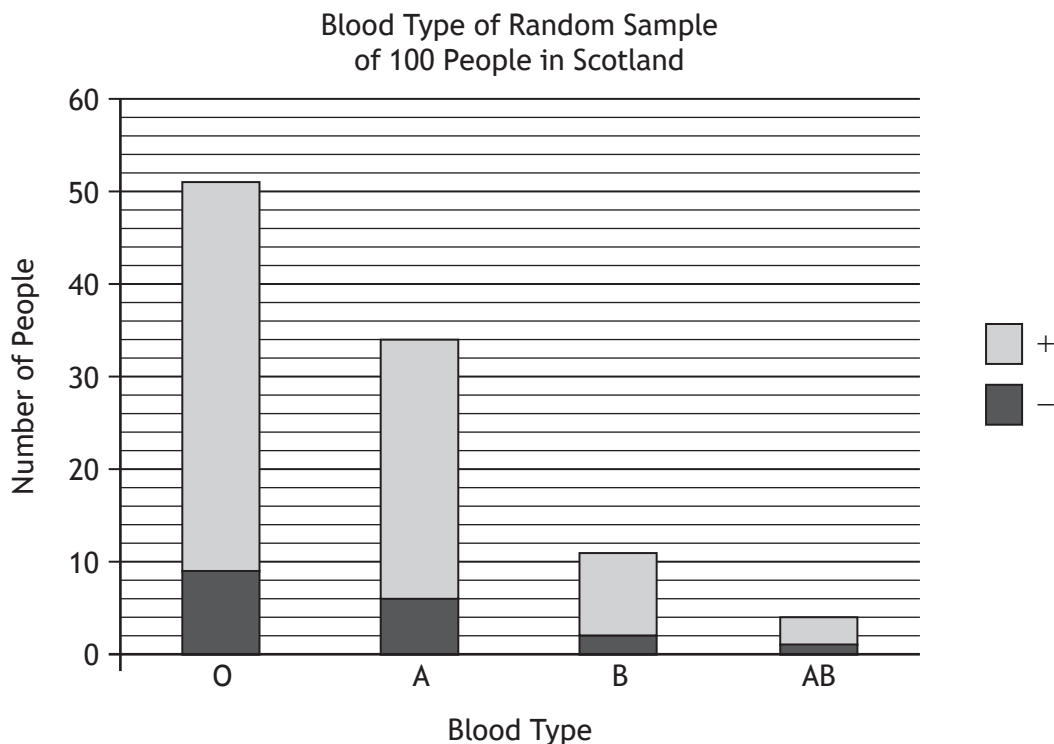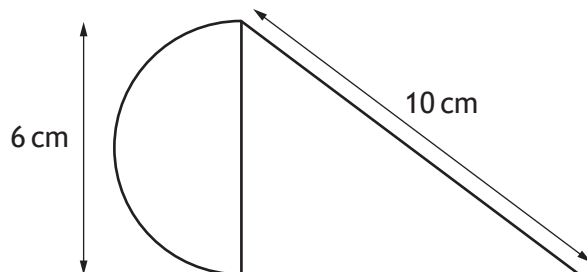
8. (continued)

Natalie's blood type is B+.

What fraction of the people sampled could safely be given Natalie's blood?   **3**

9. A new design is discussed for a glue dispenser.

It is to be made from two plates of plastic.

Each plate is in the shape of a right angled triangle and a semi-circle as shown.

6 cm

10 cm

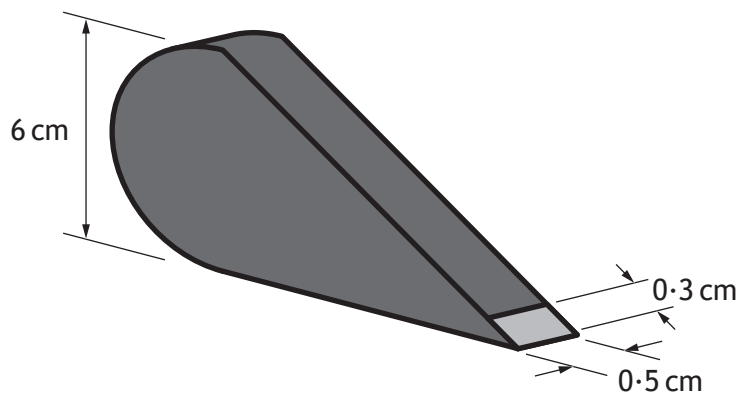(a) Calculate the perimeter of each plate.

Use $\pi = 3\cdot 14$.

4

9. (continued)

A rectangular piece of plastic 0·5 cm wide is bent and wrapped around the perimeter of the two plates to join them together.

The rectangular piece of plastic will be 0·3 cm shorter than the perimeter of the shape to allow the glue to flow.

6 cm

0·3 cm

0·5 cm

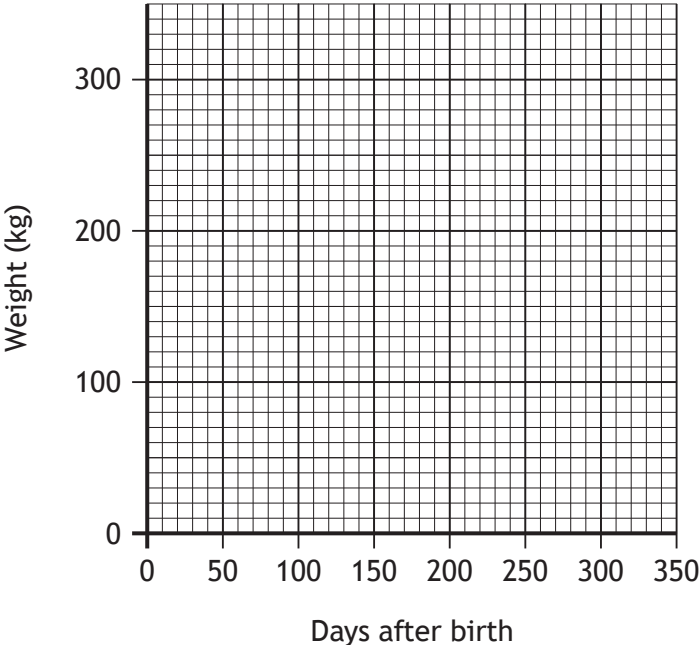(b) Calculate the area of the **rectangular** piece of plastic required to hold the plates together.

2

[END OF QUESTION PAPER]

ADDITIONAL SPACE FOR ANSWERS

Additional grid for Question 3 (a)

ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL SPACE FOR ANSWERS

N5

National Qualifications 2017

Mark

X744/75/02

Lifeskills Mathematics Paper 2

X7447502

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 — 55

Attempt ALL questions.

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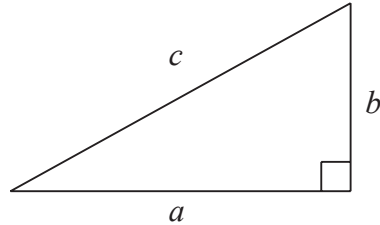
SQA ©

X74475020 1

FORMULAE LIST

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Area of a circle: $A = \pi r^2$

Theorem of Pythagoras:

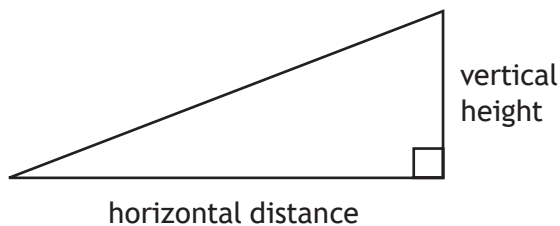$$a^2 + b^2 = c^2$$

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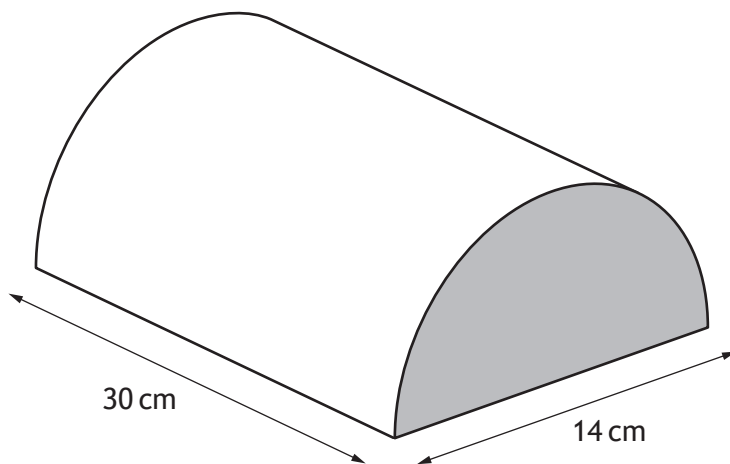
Gradient:

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

1. The Victorians used stoneware hot water bottles.

    They were semi-circular prisms as shown.

    The diameter of the bottle is 14 cm and the length is 30 cm.

    Calculate the volume of the hot water bottle.   **3**

2. Asif bought 8000 shares in a local company in April 2013.

Each share cost him 73 pence.

The value of the shares

- decreased by 3% in the first year then,

- increased by 4·2% in each of the next **two years**.

(a) How much were Asif's shares worth in total in April 2016?   **5**

In April 2017 Asif's shares were worth £6560 in total.

He decided to sell 5000 of his shares.

He was charged £12·95 commission on his sale.

(b) How much did he receive from the sale of the shares?   **2**

3. Kyle is buying a new three piece suite.

It is advertised at a price of £1260.

3 PIECE SUITE FOR SALE

£1260

Kyle can't afford to pay this all at once.

He decides to use a payment plan to buy the three piece suite.

The **total price** of the payment plan is **12% more** than the advertised price.

The payments are calculated as follows:

- deposit of $\frac{1}{3}$ of the total price
- 8 equal monthly instalments
- final payment of £200.

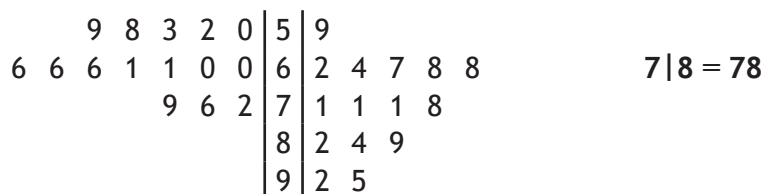How much will each monthly instalment be?   **4**

4. The back to back stem and leaf diagram shows data gathered at a gymnasium before and after walking on a treadmill.

Heart rate data (beats per minute (bpm))

Before   **After**

```
        9 8 3 2 0 | 5 | 9
  6 6 6 1 1 0 0 | 6 | 2 4 7 8 8           7 | 8 = 78
        9 6 2 | 7 | 1 1 1 8
              | 8 | 2 4 9
              | 9 | 2 5
```

        n = 15   **n = 15**

(a) State the most common heart rate (bpm) **after** walking on the treadmill.   **1**

(b) What is the difference in the median heart rates (bpm) before and after walking on the treadmill?   **2**
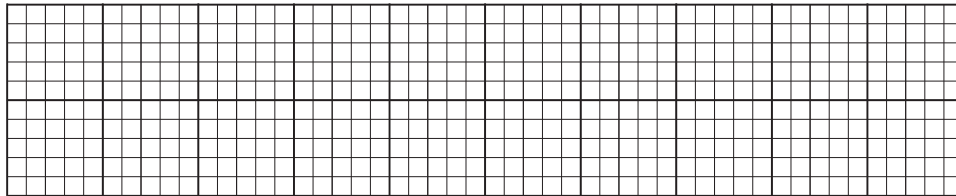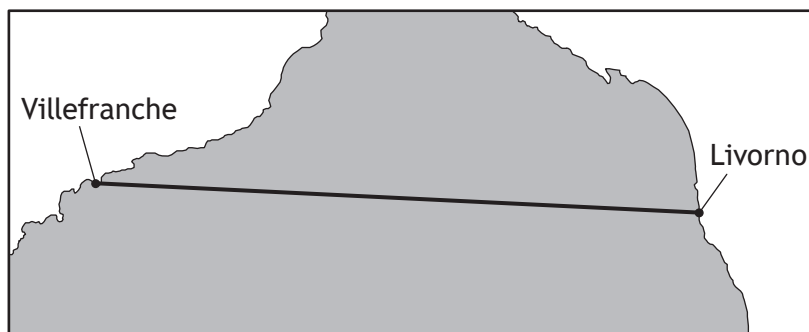
4. (continued)

    (c) Construct a boxplot to show the heart rate data **after** exercise.   **4**

        (An additional diagram, if required, can be found on *Page 16*.)

5. Mr and Mrs Sibbald went on a cruise.

Part of the cruise involved sailing from Villefranche to Livorno.

The map below shows the route the ship takes.

The scale of the map is 1 : 3 000 000

(a) Calculate the distance from Villefranche to Livorno.

Give your answer in kilometres.

2

It took 7 hours and 30 minutes to sail from Villefranche to Livorno.

(b) Calculate the average speed of the ship's journey.

Give your answer in knots.

1 kilometre per hour = 0·54 knots

Round your answer to 2 significant figures.

3

5. (continued)

Mr and Mrs Sibbald took £2400 spending money.

They exchanged 55% of their money into euro, to spend ashore.

The exchange rate was **£1** = **1·15 euro.**

By the end of the cruise they had spent 1379 euro.

(c) Calculate how many euro they had left at the end of the cruise. **2**

Mr and Mrs Sibbald take part in an on board lottery which consists of a draw from a set of 32 balls numbered from 1 to 32.

(d) (i) What is the probability that the first ball drawn has a number greater than 25? **1**

In the draw four numbered balls are drawn and not replaced.

A further bonus ball is also drawn.

(ii) What is the probability of the number 9 being drawn as the bonus ball if it was not drawn in the first four? **2**

6. Russell is a lorry driver for a mail delivery company.

The mail is packed into cages which are then loaded on to the lorry.

His lorry has two levels for fitting cages.

Each cage has wheels on the bottom and must always be **loaded upright**.

The dimensions of the cage and the internal dimensions of the back of the lorry are shown in the diagrams.

1·35 m

0·75 m

0·85 m

15 m

2·25 m

1·4 m

1·4 m
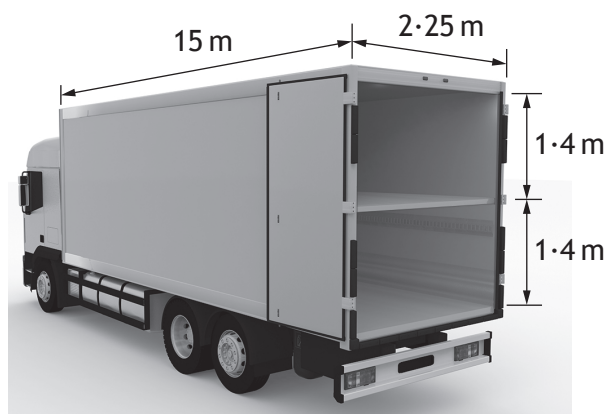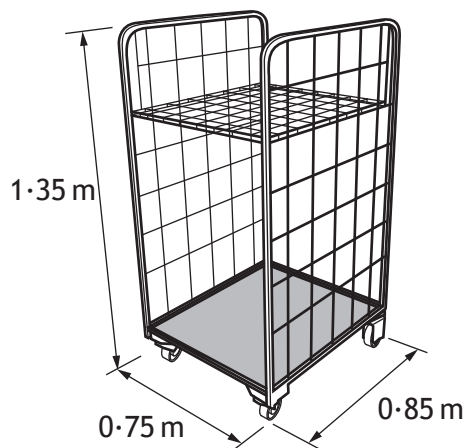
(a) What is the maximum number of cages that can be loaded into the back of the lorry?

3

6. (continued)

Russell works night shift.

- He works from 2300 until 0900 the next day.
- His rate of pay is £14·40 per hour.
- He gets paid time and a half between 2200 and 0730.
- He works 5 shifts each week.

(b) Calculate his weekly gross pay.   **3**

7. Mr Mackenzie has decided to move to South Africa with his family. He has been offered jobs in both Durban and Cape Town.

The typical monthly temperatures from March to August in Durban are recorded in the table below.

Month	Temperature (°C)
March	24
April	22
May	19
June	18
July	17
August	17

(a) For the typical monthly temperatures in Durban, calculate:

   (i) the mean;   **1**

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

7. **(continued)**

In Cape Town the mean monthly temperature for the same period is 15·5 °C and the standard deviation is 1·87 °C.

(b) Make two valid comments comparing the temperatures in both cities. **2**

Mr Mackenzie accepts the job in Durban.

As part of his job he is in contact with the London, New York and Mumbai offices of the company he works for.

He is planning a conference call at 3:30 pm the following day, from his office in Durban.

At 17:25 he noticed the clocks on the wall of his office showed the times below.

10:25	15:25	17:25	22:55
New York	London	Durban	Mumbai

All offices work 08:00 to 18:00 local time.

(c) Which offices are available to take part in the conference call? **3**

8. Zuzanna is remodelling her shower room.

She considers two designs.

The first design has a pentagonal shower tray.

The door will be fitted on the side of the tray as shown.

900 mm

400 mm

900 mm

shower tray

door

400 mm
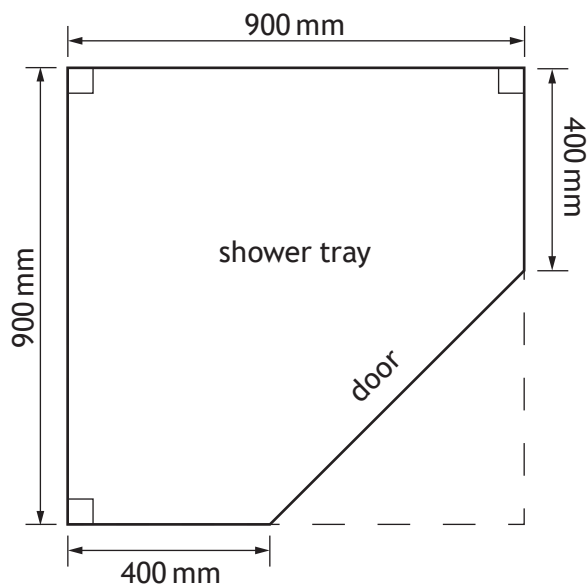
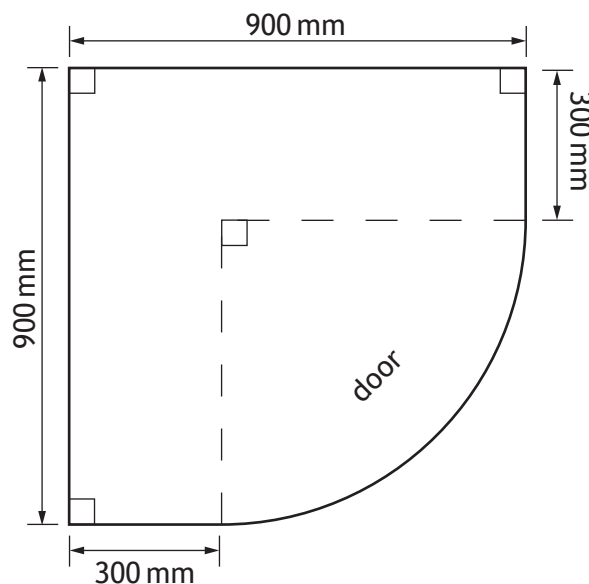(a) Calculate the length of the side where the door will go. **3**

(b) Calculate the area of the pentagonal shower tray. **2**

8. (continued)

The second design that Zuzanna is considering is the offset quadrant shower tray shown below.

The offset quadrant design has quarter of a circle forming part of the edge.

(c) Zuzanna will choose the design that gives the greater area.

Which design will Zuzanna choose, the pentagonal or the offset quadrant shower tray?

Use your working to justify your answer.
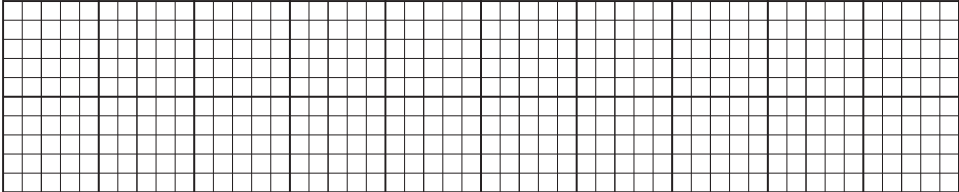
4

[END OF QUESTION PAPER]

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Page 15

ADDITIONAL SPACE FOR ANSWERS

Additional diagram for use in Question 4 (c).

ADDITIONAL SPACE FOR ANSWERS

Page 17

ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL SPACE FOR ANSWERS