

NCFE Level 2 Functional Skills Qualification in Mathematics (603/5060/X)

Paper number: P001259
Section B: Calculator Test



Assessment window: Monday 9 December 2019 – Friday 13 December 2019
Time allowed: 1 hour 30 minutes

Learner instructions

- Answer **all** questions.
- Read each question carefully.
- Write your answers in the spaces provided.
- Show your working, as marks may be awarded for working.
- State units in your answers, where appropriate.
- Check your work.
- Use $\pi = 3.14$

Learner information

- Section B contains **Activities 2, 3 and 4**.
- The maximum mark for this section is **45**.
- The marks available for **each** question are shown in brackets.

Resources

You will need a:

- pen, with black or blue ink
- pencil and eraser
- 30 cm ruler
- protractor
- calculator.

If extra pages are used, please make sure your name and centre name are on them and they are securely fastened to this booklet.

Please complete the details below clearly and in BLOCK CAPITALS.

Learner name _____

Centre name _____

Learner number

Centre number

Do not turn over until the invigilator tells you to do so.

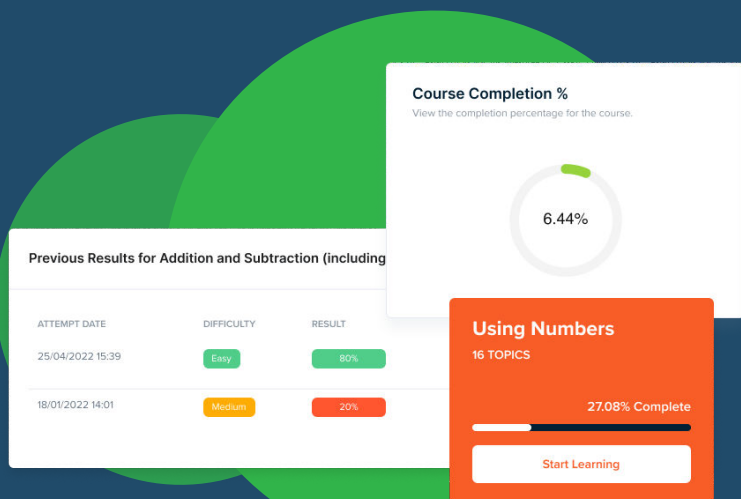
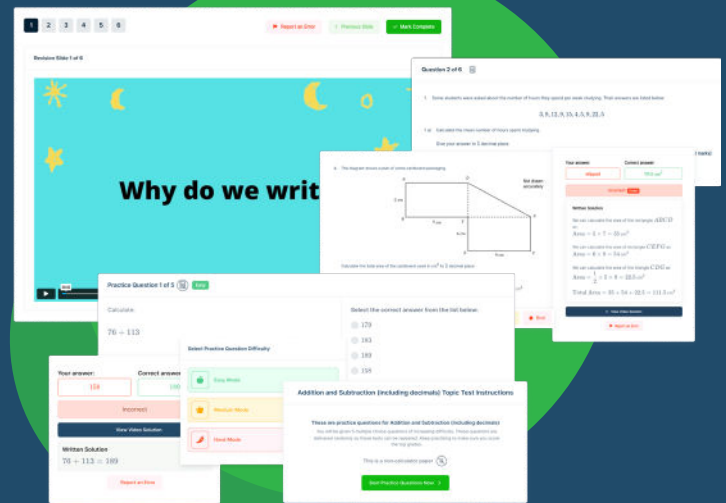


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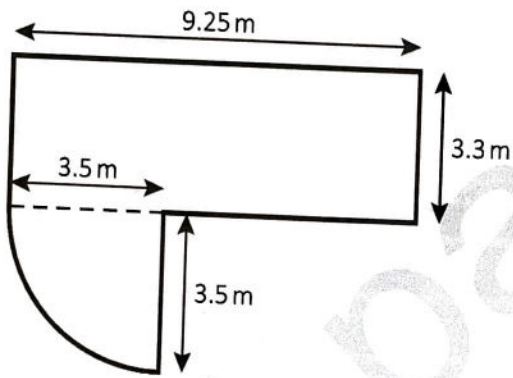
Activity 2: Running a business

2 (a) Dan has set up a patio cleaning business.

He charges £4.25 per m^2 of the patio to be cleaned.

Mrs Jones has asked Dan how much he will charge for cleaning her patio.

This diagram shows her patio:



Not drawn
accurately

How much will Dan charge Mrs Jones for cleaning her patio?

Use $\pi = 3.14$

[4 marks]

$$9.25 \times 3.3 = 30.525 \text{ m}^2.$$

$$\frac{1}{4} \times 3.14 \times 3.5^2 = 9.61625 \text{ m}^2.$$

$$\begin{aligned} 30.525 + 9.61625 \\ = 40.14125 \text{ m}^2 \end{aligned}$$

$$40.14125 \times £4.25 = £170.60$$

Your answer:

£ 170.60

Please turn over

2 (b) Mr Patel pays Dan £250 to clean his patio.

The £250 includes VAT at 20%

How much was the bill before the VAT was added?

[2 marks]

$$\frac{£250}{1.2} = £208.33$$

Your answer:

£ 208.33

2 (c)

Dan needs to make a mixture of weed killer and water to clean Mr Patel's patio.

The area of the patio to be sprayed is 63.2 m^2



He fills the spray tank with the weed killer and water mixture.

How many times does Dan need to fill the spray tank to cover the whole patio?

[3 marks]

$$20 \times 63.2 = 1264 \text{ ml} \quad \text{Weed killer needed.}$$

$$\Rightarrow 12640 \text{ ml} \quad \text{water needed}$$

$$1264 + 12640 = 13904 \text{ ml} = 13.904 \text{ L}$$

$$\frac{13.904}{5} = 2.7808$$

$\rightarrow 3$ times

Your answer:

3

Please turn over

- 2 (d) Dan wants to expand his business.

Next year he plans to clean patios from 8.30am to 3.30pm, Monday to Friday for 26 weeks during the spring and summer.

This table shows how long each job took Dan **this year**.
The times include travel time.

Time per cleaning job	Number of jobs
$30 < \text{time} \leq 60$ minutes	25
$60 < \text{time} \leq 90$ minutes	36
$90 < \text{time} \leq 120$ minutes	45
$120 < \text{time} \leq 150$ minutes	21
Total	127

Use the data to estimate how many patios Dan can clean **next year** if he works the hours planned.

[5 marks]

$$8:30_{am} - 3:30_{pm} = 7 \text{ hours.}$$

$$7 \text{ hr/day} \times 5 \text{ day/wk} \times 26 \text{ wk/yr} = 910 \text{ hrs /yr.}$$

$$(45 \times 25) + (75 \times 36) + (105 \times 45) + (135 \times 21)$$

$$= 11385 \text{ mins total.}$$

$$= 189.75 \text{ hrs total.}$$

$$\Rightarrow \frac{189.75}{127} = 1.494 \text{ hrs /job (avg)}$$

$$\frac{910}{1.494} = 609.06 \text{ jobs}$$

Your answer:

609

patios

2 (e)

This table shows how long each job took Dan **last year**.

Time per cleaning job	Number of jobs
$30 < \text{time} \leq 60$ minutes	14
$60 < \text{time} \leq 90$ minutes	22
$90 < \text{time} \leq 120$ minutes	30
$120 < \text{time} \leq 150$ minutes	16
Total	82

Dan's accounts are checked by the tax office.

They pick one of **last year's** jobs at random to check.

What is the probability that the job would have taken more than 90 minutes?

[1 mark]

$$\frac{30+16}{14+22+30+16} = \frac{46}{82} = 0.5610$$

Your answer:

0.561

[Total marks: 15]

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past paper

Activity 3: Cycling

3 (a) There are 51 million adults in the UK.

20.5 million do **not** do any regular exercise.

What fraction of adults in the UK do **not** do any regular exercise?

[1 mark]

$$\frac{20.5}{51} = \frac{41}{102}$$

Your answer:

$$\frac{41}{102}$$

3 (b) The proportion of commuters who cycle to work in the UK is 0.06

Write 0.06 as:

- a fraction
- a percentage.

[2 marks]

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Your answer:

Fraction:

$$\frac{6}{100}$$

Percentage:

6%

Please turn over

- 3 (c)** Jackie is training for a cycle race.
She reads a cycling blog.

It says that cyclists should aim to keep their heart rate above 72% of their maximum heart rate.

Jackie uses this formula to work out her maximum heart rate:

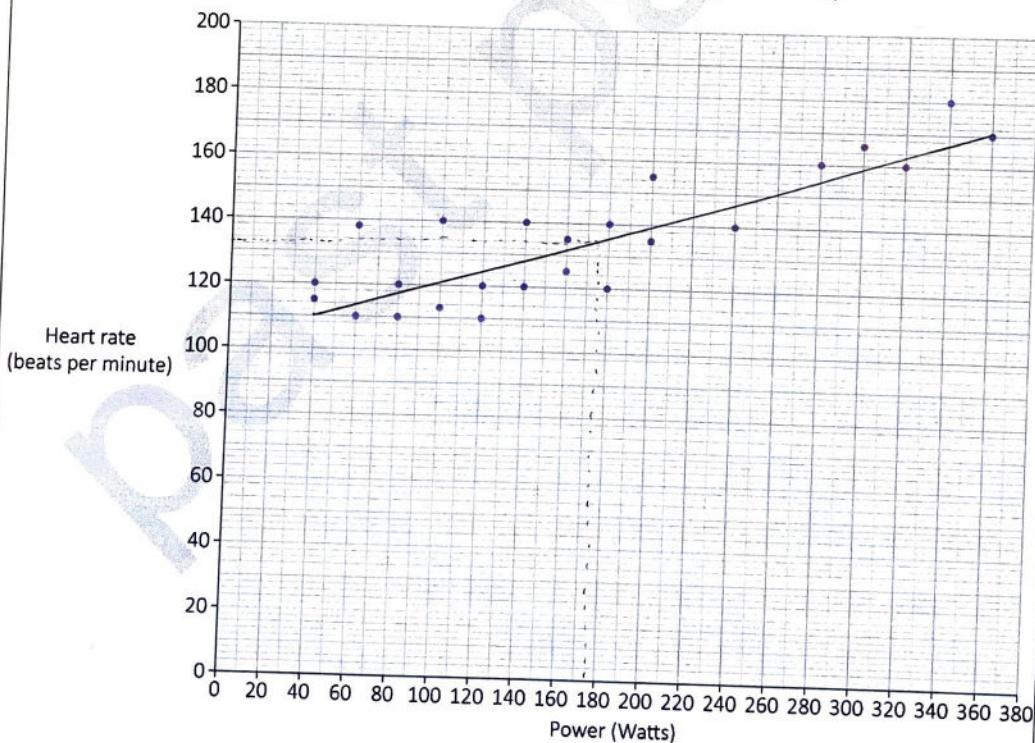
$$M = 191.5 - 0.007A^2$$

Where: M is the maximum heart rate in beats per minute
 A is age in years.

Jackie is 25 years old.

This scatter diagram shows the relationship between power (in Watts) and heart rate (beats per minute):

**Relationship between power (in Watts)
and heart rate (in beats per minute)**



To produce 100 Watts of power, a cyclist uses about 350 kilocalories per hour.

Estimate the number of kilocalories Jackie uses per hour if she cycles at 72% of her maximum heart rate.

[6 marks]

$$M = 191.5 - (0.007 \times 25^2)$$

$$= 191.5 - 4.375$$

$$= 187.125 \text{ (max heart rate)}$$

$$187.125 \times 0.72 = 134.73 \text{ bpm.}$$

$$\Rightarrow 175 \text{ W}$$

$$\frac{175}{100} \times 350 = 612.5 \text{ kcal/hr.}$$

Your answer:

612.5

kilocalories

Please turn over

3 (d) Rafa and his friends cycle to keep fit.

They want to reduce the mean time it takes them to cycle 10 km

Their target is to reduce the time by 11% within 12 weeks.

This table shows their times in **Week 1** and **Week 12**.

	Time (minutes) to cycle 10 km	
	Week 1	Week 12
Ann	26.3	23.9
Mike	22.0	20.2
Rafa	28.1	25.7
Ali	24.9	20.4
Maria	18.4	18.1
Luke	21.7	20.7
Becky	20.3	17.3

Has the group achieved its target?

Show how you decide.

[4 marks]

$$\text{Wk 1: } \frac{26.3 + 22.0 + \dots + 21.7 + 20.3}{7} = 23.1$$

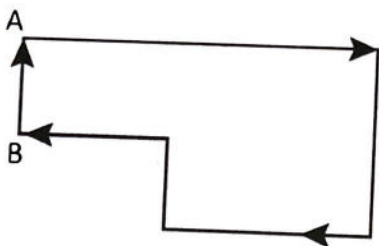
$$\text{Wk 12: } \frac{23.9 + 20.2 + \dots + 20.7 + 17.3}{7} = 20.9$$

$$\frac{23.1 - 20.9}{23.1} \times 100 = 9.52\%$$

Your answer:

No.

- 3 (e) Peta cycles around this route:



Not drawn accurately

She starts at A.

When she reaches B she has cycled 12.5 miles.

- (i) What is 12.5 miles in km?

Use this conversion: $1.6 \text{ km} = 1 \text{ mile}$

[1 mark]

$$12.5 \times 1.6 =$$

Your answer:

20

The total route is 23 km

- (ii) What fraction of the total route has she cycled when she reaches B?

[1 mark]

~~12.5/23~~

$$\frac{20}{23}$$

Your answer:

$\frac{20}{23}$

[Total marks: 15]

Please turn over

Activity 4: Packaging

- 4 (a)** Beth is on a work placement.
The company makes biscuits.

In 2018 it reduced the number of biscuits in each packet.

The weight of each biscuit stayed the same.

The weight of a packet went from 135 g to 108 g

The 135 g packet contained 25 biscuits.

How many fewer biscuits did the 108 g packet contain?

[2 marks]

$$\frac{108}{135} \times 25 = 20$$

$$25 - 20 =$$

Your answer:

5

biscuits

- 4 (b) The company also makes pizza.

This table shows information about the two sizes it sells:

Pizza	Diameter	Depth
Large	38 cm	2 cm
Small	19 cm	1.5 cm

Beth says that the large size gives over 5 times as much pizza as the small size.

Is Beth correct?

Show how you decide.

Use $\pi = 3.14$

[4 marks]

$$38\text{cm Di.} \rightarrow 19\text{cm radius}$$

$$3.14 \times 19^2 \times 2 = 2267.08 \text{ cm}^3.$$

$$19\text{cm Diameter} \rightarrow 9.5\text{cm radius}$$

$$3.14 \times 9.5^2 \times 1.5 = 425.0775 \text{ cm}^3$$

$$\frac{2267.08}{425.0775} = 5.3$$

Your answer:

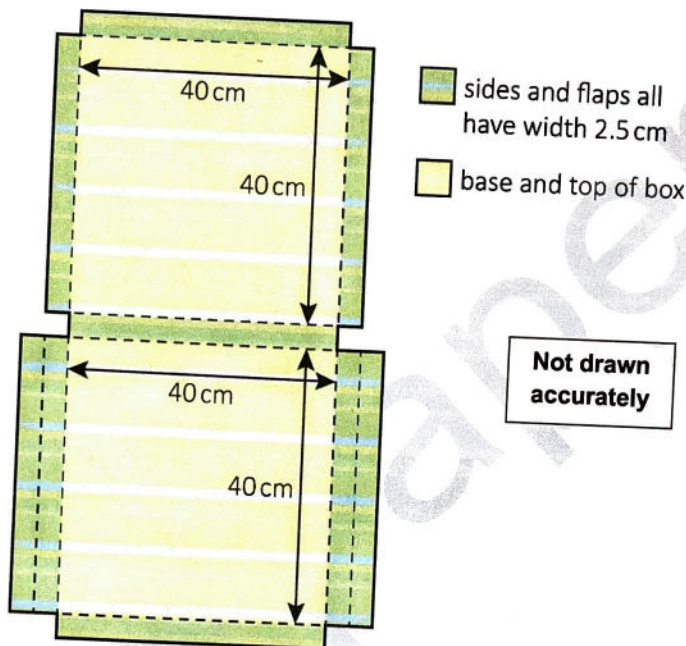
Yes.

Please turn over

- 4 (c) The large pizzas are sold in cardboard boxes.

When closed, the boxes measure 40 cm by 40 cm by 2.5 cm and are cuboid.

This is the net of the pizza box:



The company thinks it could use the same net but reduce the dimensions to 38 cm by 38 cm by 2 cm

Beth is asked to calculate the percentage reduction in cardboard if the smaller boxes are used.

What answer should Beth get?

[5 marks]

$$(40 \times 40 \times 2) + (9 \times 2.5 \times 40) \\ = 4100 \text{ cm}^2.$$

$$(38 \times 38 \times 2) + (9 \times 2.5 \times 38) \\ = 3572 \text{ cm}^2.$$

$$\frac{4100 - 3572}{4100} \times 100 = 12.878\%$$

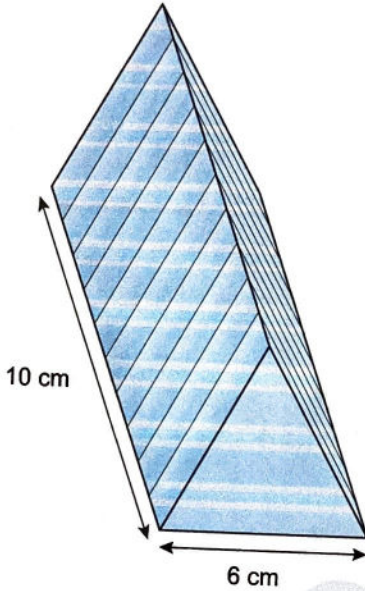
Your answer:

12.878

%

4 (d) The company also makes a chocolate bar.

It is divided into 10 identical triangle-shaped pieces.

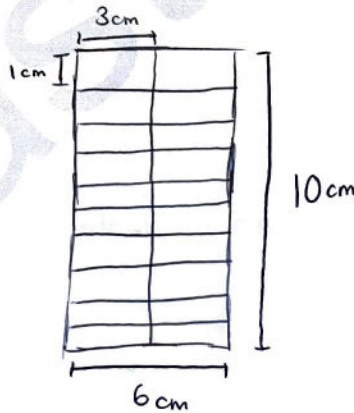


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Draw a plan view of the bar in the space below.

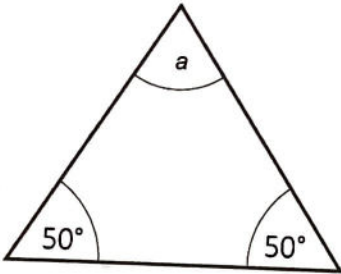
Label the dimensions.

[3 marks]



4 (e)

One triangular face of the chocolate bar is shown in the diagram.



Not drawn
accurately

Calculate the size of the angle labelled a

[1 mark]

$$180^\circ - (2 \times 50^\circ) = 80^\circ$$

Your answer:

80 °

[Total marks: 15]

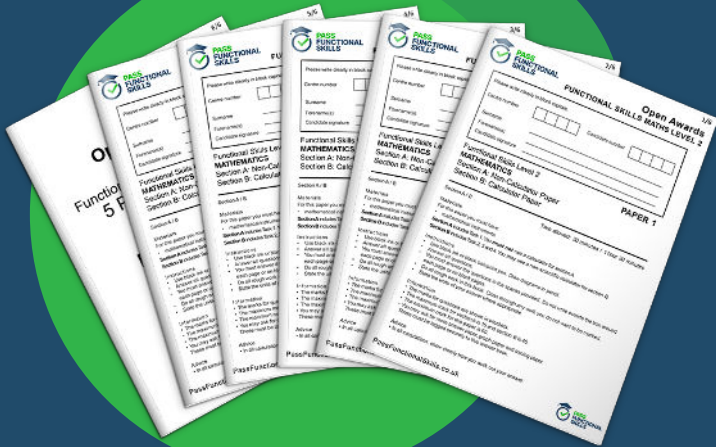
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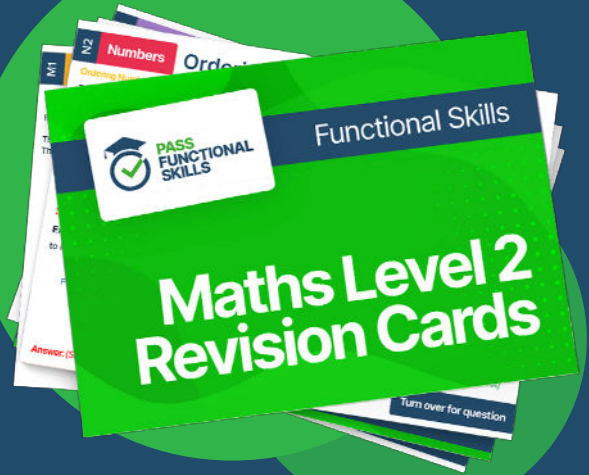
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