

# ncfe.

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

Paper number: SAM  
 Section B: Calculator Test



**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.**



PASS  
FUNCTIONAL  
SKILLS

# FUNCTIONAL SKILLS ONLINE COURSES

Functional Skills English Initial Assessment  
English

Functional Skills Maths Initial Assessment  
Maths

Recommendations

Based on your results from this initial assessment, we estimate you are currently at **Level 1.5**. From this diagnostic, we think one of the following courses would be suitable:

- Functional Skills Maths Level 2**
  - 35 Topic Count
  - 105 Tests
  - 43 Mock Exams

**Start Initial Assessment**

**Start Initial Assessment**

**Enrol Now**

**Pick my own**

- ✓ Explainer videos on every topic
- ✓ Quick-fire style multiple choice questions
- ✓ Test your knowledge with exam-style questions
- ✓ Written solutions for all questions

Course Completion %

View the completion percentage for the course.

6.44%

Previous Results for Addition and Subtraction (including)

ATTEMPT DATE	DIFFICULTY	RESULT
25/04/2022 15:39	Easy	80%
18/01/2022 14:01	Medium	20%

**Using Numbers**  
16 TOPICS  
27.08% Complete

**Start Learning**

- ✓ Your answers are analysed to determine your Current Level
- ✓ Suggested courses for you to enrol on based on your calculated level
- ✓ Always know the level you are currently working at
- ✓ Determine when you are ready to sit your exam

Topic: Addition and Subtraction (including decimal) Topic Test Instructions

Question 2 of 6

1. Some students were asked about the number of hours they spent per week studying. Their answers are listed below.

2.8, 12.8, 15, 4.8, 9, 21.3

For 1, how many hours did most students spend studying?

Give your answer to 1 decimal place.

For 2, calculate the total area of the shaded region.

For 3, calculate the area of the triangle ABCD.

Area =  $\frac{1}{2} \times 8 \times 10 = 40$  cm<sup>2</sup>

Total Area =  $40 + 10 \times 8 + 10 \times 10 = 110$  cm<sup>2</sup>

**Calculator**

70 + 113 = 183

**Select Practice Question Difficulty**

**Your answer:**

**Correct answer:**

**Incorrect:**

**Easy Mode:**

**Medium Mode:**

**Hard Mode:**

**Written Solution:**

Written Solution

70 + 113 = 183

**Report answer**

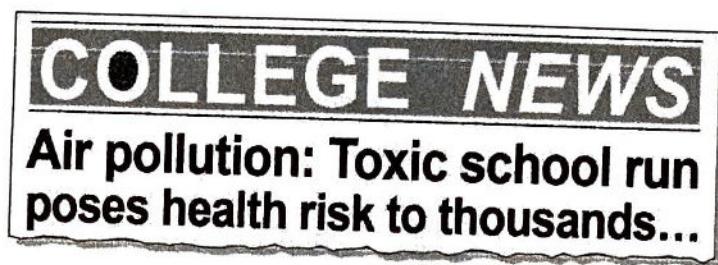
- ✓ See your progress through as you progress through each topic area
- ✓ Get your average scores for practice questions, topic tests and mock exams
- ✓ View all practice question, topic test and mock exam attempts over time
- ✓ View historical attempts to analyse your progress over time

Or visit  
**passfunctionalskills.co.uk**

**This page is intentionally left blank.**

## Activity 2: Pollution

Ali sees an article about the health risk from pollution caused by cars and other vehicles.



- 2 (a) The article states that, every year, nine hundred and seventy thousand, two hundred and fifteen working days are lost due to air pollution-related illness.

Write nine hundred and seventy thousand, two hundred and fifteen as a number.

[1 mark]

970, 215

- 2 (b) 84% of the days lost due to air pollution related illnesses are due to breathing related problems.

Calculate the number of days lost due to breathing related problems.  
Give your answer to the nearest thousand.

[2 marks]

$$970215 \times 0.84 = 814980.6$$

→ ~~814980~~ 815000

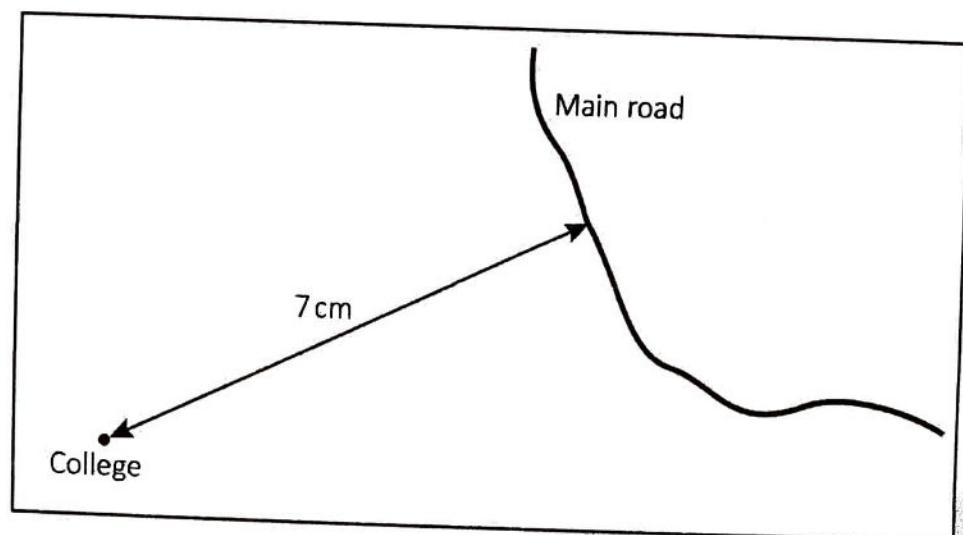
Your answer:

815000 days

Please turn over

- 2 (c) Schools and colleges can have very high levels of air pollution if they are close to a main road.

This is a map of the area around Ali's college:



At its closest point, the main road is 0.35 km from the college.

What scale has been used for this map? Give your answer in the form 1 : N

[2 marks]

$$0.35 \text{ km} = 350 \text{ m} = 35000 \text{ cm}.$$

$$\frac{7}{7} : \frac{35000}{7}$$

Your answer:

1 : 5000

2 (d) Some students drive or get a lift by car to and from college.

Ali wants to encourage students to travel to college by other methods of transport.

He conducts a survey to find out how students travel to college.

This table shows his results:

Method of transport to college	Number of students
Walk	52
Car	36
Bus	28
Cycle	4

What fraction of students travel to college by car?  
Give your answer in its **simplest form**.

[1 mark]

$$\frac{36}{52+36+28+4} = \frac{36}{120} = \frac{3}{10}$$

Your answer:

$\frac{3}{10}$ .

Please turn over

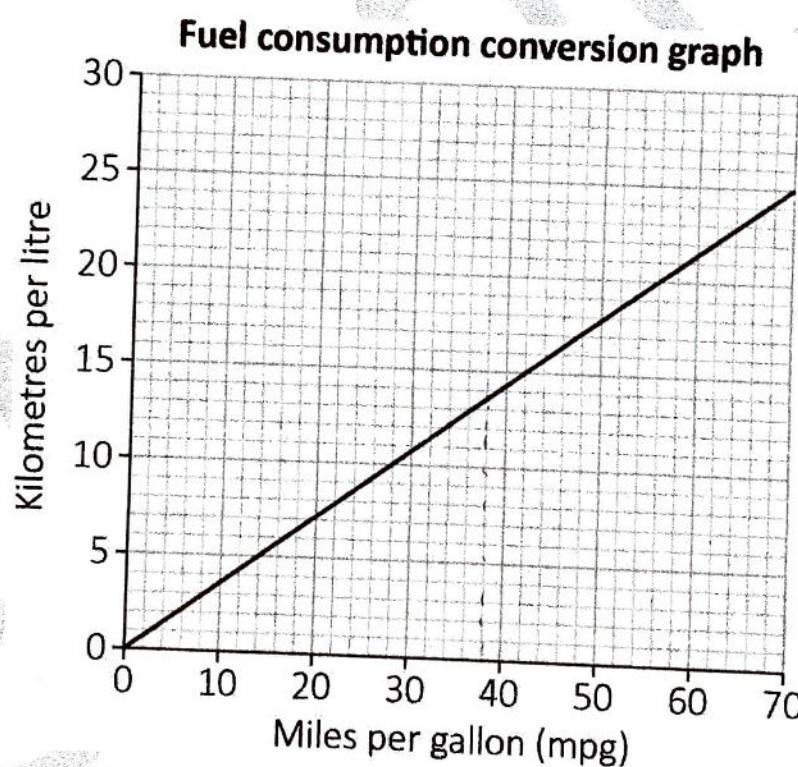
- 2 (e) Ali wants to find out how much pollution is produced by students travelling between home and college by car.

He asks the students that travel to college by car how far they live from the college. The students attend college on 164 days per year.

This table shows his results:

Distance from home to college in kilometres (km)	Number of students
0 km < distance $\leq$ 1 km	13
1 km < distance $\leq$ 2 km	11
2 km < distance $\leq$ 3 km	7
3 km < distance $\leq$ 4 km	5

Ali finds this conversion graph:



The average fuel consumption of a car is 38 miles per gallon (mpg).

A typical car produces 2.44 g of nitrogen dioxide ( $\text{NO}_2$ ) per litre of petrol used.

Ali uses the estimated mean distance to calculate the average amount of NO<sub>2</sub> produced.

Calculate the average amount of NO<sub>2</sub> produced by a student who travels by car to and from college for 164 days.

[6 marks]

$$(13 \times 0.5) + (11 \times 1.5) + (7 \times 2.5) + (5 \times 3.5) = 58 \text{ km total.}$$

$$13 + 11 + 7 + 5 = 36.$$

$$\frac{58 \text{ km}}{36} = 1.61 \text{ km average.}$$

$$1.61 \times 2 \times 164 = 528.4 \text{ km}$$

$$38 \text{ mpg} = 13.5 \text{ km/L.}$$

$$\frac{528.4 \text{ km}}{13.5 \text{ km/L}} = 39.144 \text{ L.}$$

$$39.144 \text{ L} \times 2.44 \text{ g/L} = 95.5 \text{ g}$$

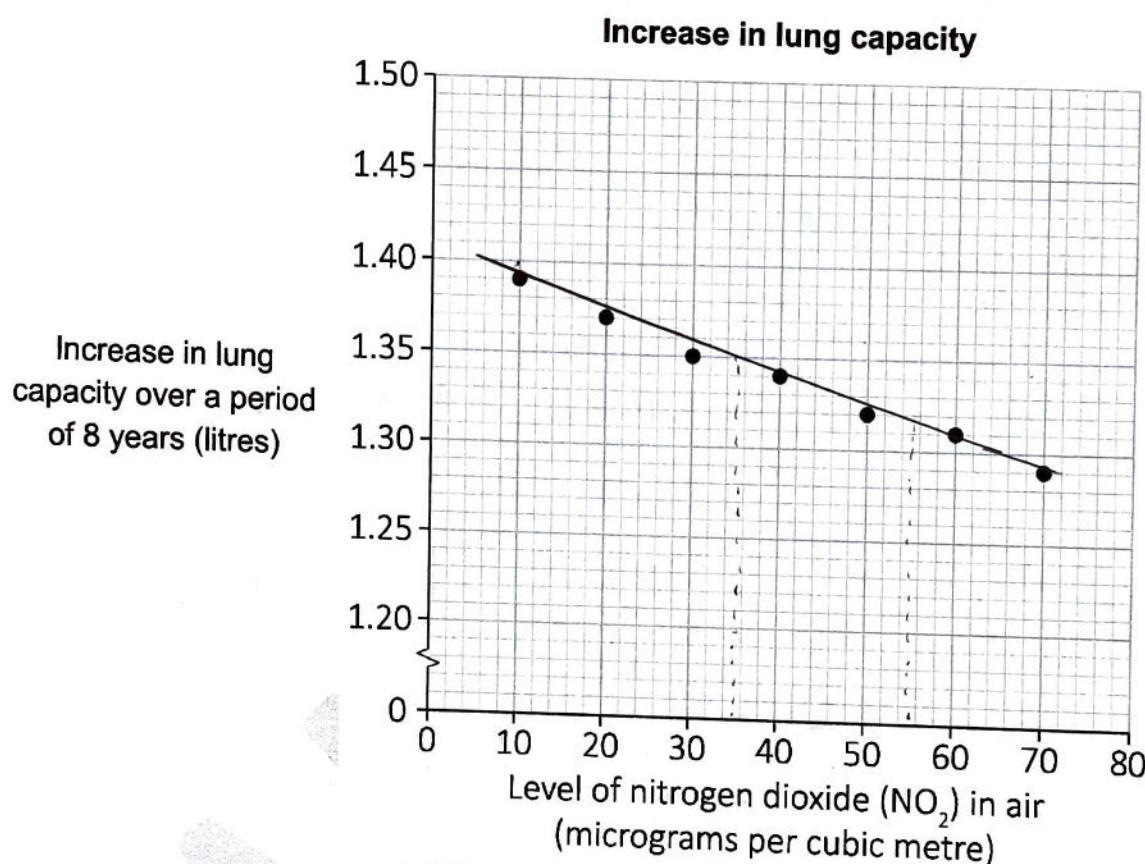
Your answer:

95.5 g

**2 (f)** Air pollution can affect the lungs.

Research has shown that, for school-aged children, exposure to nitrogen dioxide ( $\text{NO}_2$ ) is associated with reduced growth in lung volume.

This scatter diagram shows the results of a study into lung capacity.



The level of  $\text{NO}_2$  around Ali's college is typically 55 micrograms per cubic metre.

Estimate the additional lung capacity that children would gain over a period of eight years if the pollution level were to be reduced from 55 to 35 micrograms of  $\text{NO}_2$  per cubic metre.

Give your answer as a **fraction** of a litre.

[3 marks]

At  $55 \text{ mg/m}^3$  : 1.315,

At  $35 \text{ mg/m}^3$  : 1.35.

$$1.35 - 1.315 = 0.035 = \frac{7}{200}$$

Your answer:

$\frac{7}{200} \text{ L}$

[Total marks: 15]

**Activity 3: Boxes of chocolates**

- 3 (a) Kate works for a chocolate company.  
Her job is to supervise the packing chocolates into boxes.

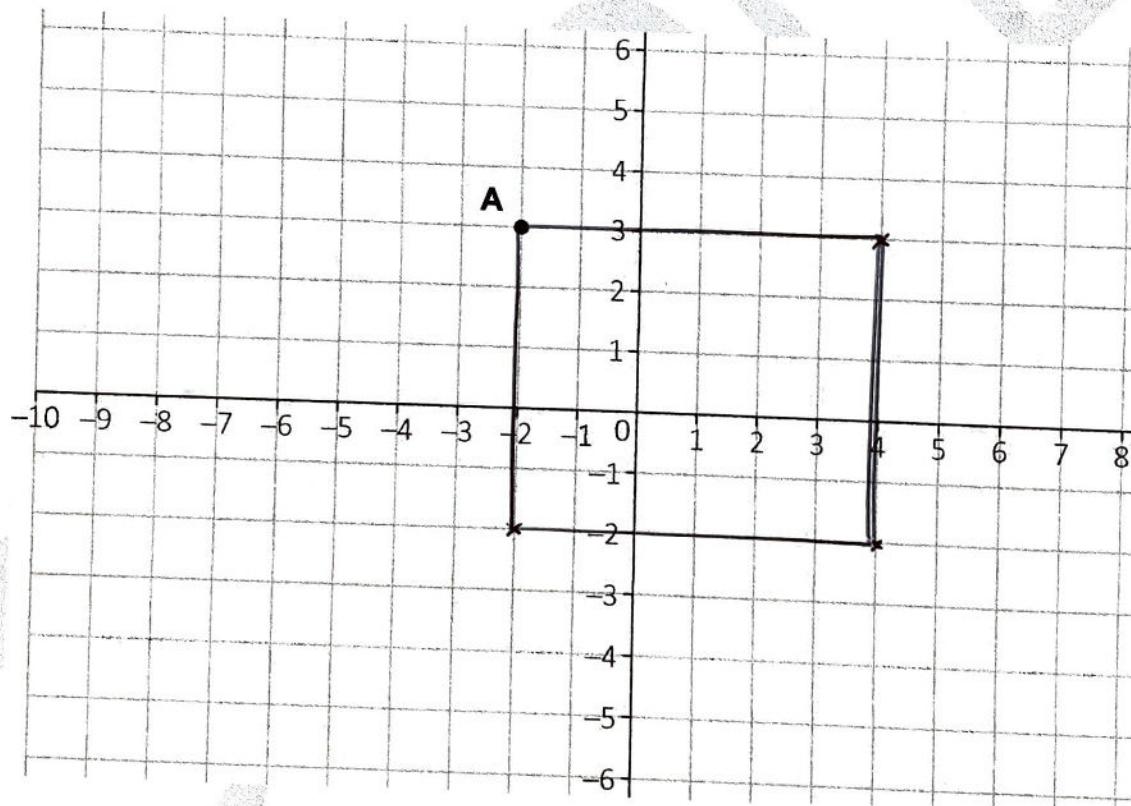
She sets up the computer to print the labels for the boxes.

The label needs to be a 6 cm by 5 cm rectangle.  
She needs to program the computer with the co-ordinates of the corners of the label.

**A** is one corner of the label. Each square represents 1 cm<sup>2</sup>

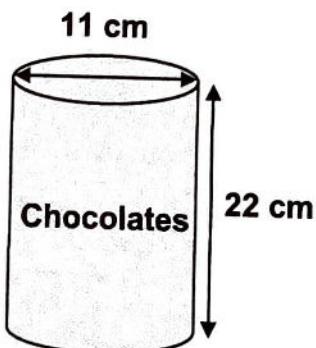
Draw one possible position for the label on the grid and write the co-ordinates of each corner.

**[2 marks]**



- 3 (b) This is a diagram of a box to be filled with chocolates. The box is a cylinder.

The diameter of the box is 11 cm, and the height is 22 cm.



Not drawn  
accurately

Calculate the volume of the box.

Use  $\pi = 3.14$

[2 marks]

$$\frac{11}{2} = 5.5 \text{ cm.}$$

$$\pi r^2 = \pi \times 5.5^2 = 94.985 \text{ cm}^2$$

(circular face).

$$94.985 \times 22 = 2089.67 \text{ cm}^3$$

Your answer:

2089.67  $\text{cm}^3$

Please turn over

- 3 (c) The boxes are filled with chocolates and weighed.

The target weight of each full box is 294 g

A box is automatically rejected if it is less than 98% of the target weight.

Kate looks at the weights of ten boxes of chocolates:

Weight in grams (g)				
295.60	286.14	284.02	298.31	294.15
294.06	303.28	285.66	299.50	300.53

Use this data to estimate the probability that the next two boxes will be rejected.  
Show your answer as a percentage.

[4 marks]

$$294 \times 0.98 = 288.12 \text{ g.}$$

3 of the 10 boxes are beneath  
this value.

$$P(\text{rejected}) = \frac{3}{10}.$$

$$\begin{aligned}P(\text{rejected} + \text{rejected}) &= \frac{3}{10} \times \frac{3}{10} = \frac{9}{100} \\&= 0.09 \\&= 9\%.\end{aligned}$$

Your answer:

9 %

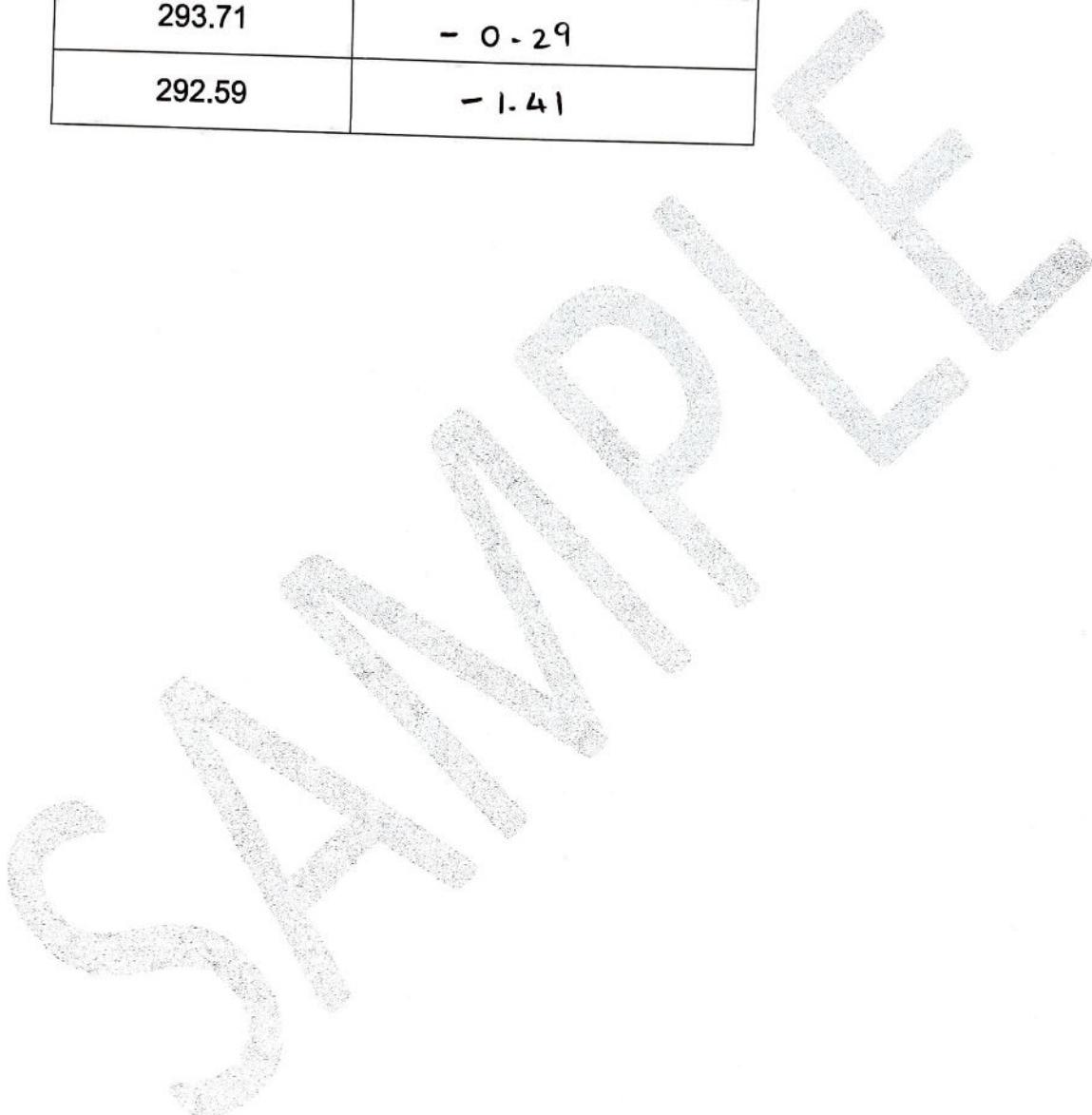
Please turn over

- 3 (d) Kate monitors the performance of the chocolate packing machine.

Using + and – complete the table showing the difference between the target weight of 294 g and the next three box weights.

[1 mark]

Weight of box (g)	+ / - Difference (g)
294.04	+ 0.04
293.71	- 0.29
292.59	- 1.41



Please turn over

- 3 (e) Kate must check that chocolates are distributed in the boxes in the correct proportions.

There are four types of chocolate: Mint, Caramel, Fudge and Toffee

The types of chocolates are produced in the ratio of 2:3:3:1

She opens a box that contains 27 chocolates in total.  
Eight of them are fudge chocolates.

Kate thinks that the box contains the correct number of fudge chocolates.

Is she right? Explain your answer.

[2 marks]

$$2+3+3+1 = 9 \text{ parts.}$$

$$\frac{27}{9} = 3 \text{ chocolates (one part).}$$

$$\Rightarrow 3 \times 3 = 9.$$

No, she is not correct.

- 3 (f) Kate checks the number of boxes of chocolates produced each hour.

The table shows the number of boxes produced over the last 24 hours:

1494	1522	1513	1498	1521	1522
1498	1473	1502	1494	1518	1494
1512	1501	1517	1493	1494	1500
1500	1494	1498	1518	1494	1473

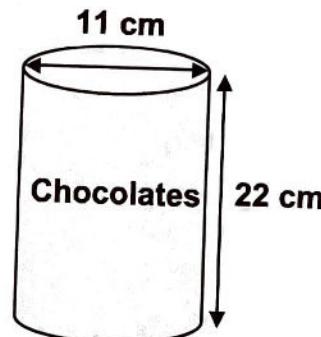
What is the mode of the number of boxes of chocolates produced per hour?

**[1 mark]**

1494		1473, 11		1493, 11	
1522	11	1502	1	1500	11
1513	1	1518	11		1
1498	111	1512	1		1
1521	1	1501	1		1
		1517	1		1

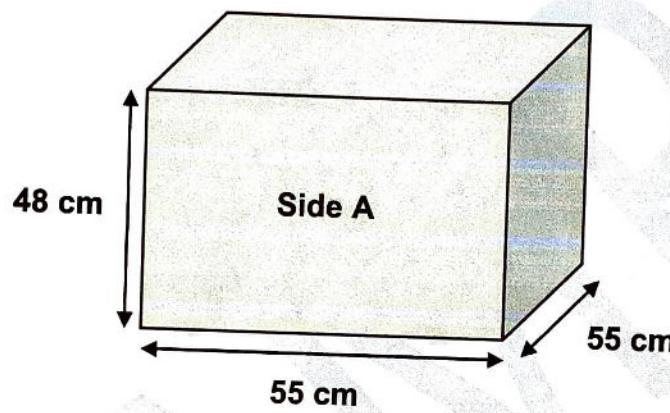
- 3 (g) Kate needs to show how the boxes of chocolates will be packed.

She needs to fit as many boxes of chocolates as possible into the delivery box.



**Not drawn accurately**

This is the delivery box:



- (i) What is the maximum number of boxes of chocolates that can be packed into the delivery box?

[1 mark]

$$\frac{48}{22} = 2.18 \Rightarrow 2. \quad \frac{55}{11} = 5.$$

$$2 \times 5 \times 5 = 50$$

Your answer:

50 boxes of chocolates

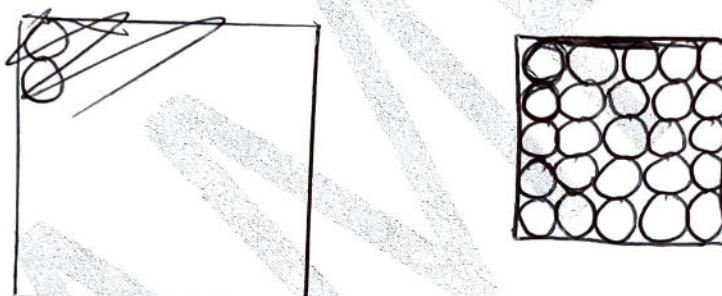
- (ii) Explain your answer by drawing a sketch of the:

- plan view **and**
- elevation of Side A

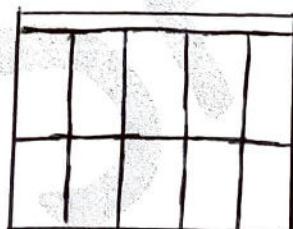
to show how the boxes of chocolate will be packed into the delivery box.

[2 marks]

**Plan view:**



**Elevation of Side A:**



**[Total marks: 15]**

**Please turn over**

**Activity 4: Training for a race**

4 (a) Kyle is training to run a half marathon.

On his next training run, Kyle wants to run 5 km. He plans a route in the park.

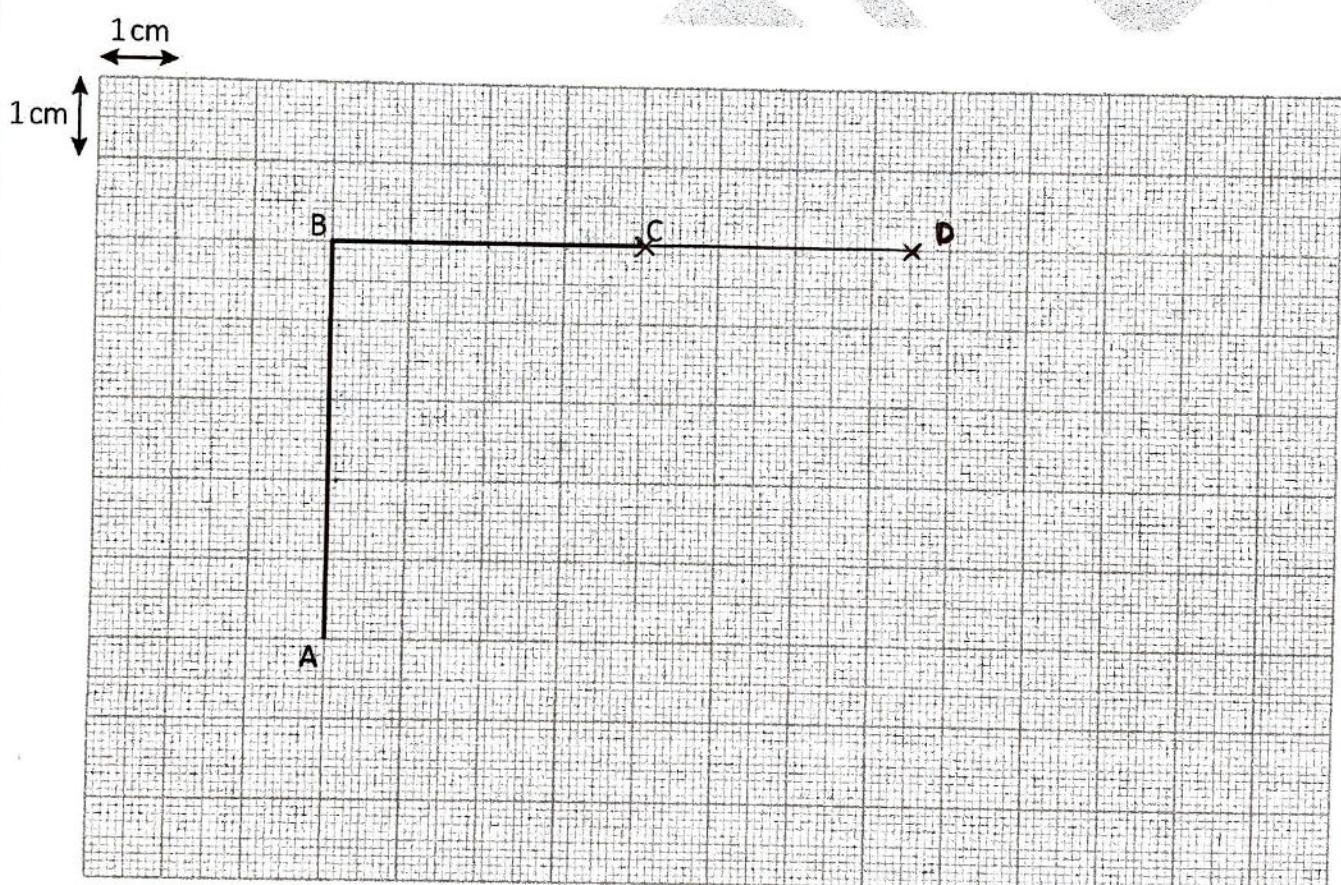
He starts at point **A**, then takes a right turn at point **B**.  
When he reaches point **C**, he stops for a rest.

At point **C** he continues to run in a straight line, in the same direction, until he has completed the full 5 km.

The scale of this plan is 1 : 40 000

Show where Kyle finishes his run by accurately placing point **D** on the plan.

[3 marks]



$$1:400000 \Rightarrow 5\text{km} = 12.5\text{cm.}$$

9cm used  $\Rightarrow$  3.5cm needed.

- 4 (b) It took Kyle 45 minutes to complete the 5 km run.  
This time was 5% longer than his previous time.

How long did Kyle take to run his previous 5 km run?  
Show your answer to 2 decimal places.

[2 marks]

$$100\% = 1.00 \text{ and } 95\% = 0.95 \text{ so } 1 + 0.05 = 1.05$$

$$0.95 \times 45 \text{ min} = 42.75 \text{ min.}$$

Then ~~we~~,

~~25% less~~ ~~needed~~.

$$\frac{45}{1.05} = 42.86 \text{ mins}$$

Your answer:

42.86 minutes

Please turn over

- 4 (c) Kyle thinks that the outside temperature affects his running speed.

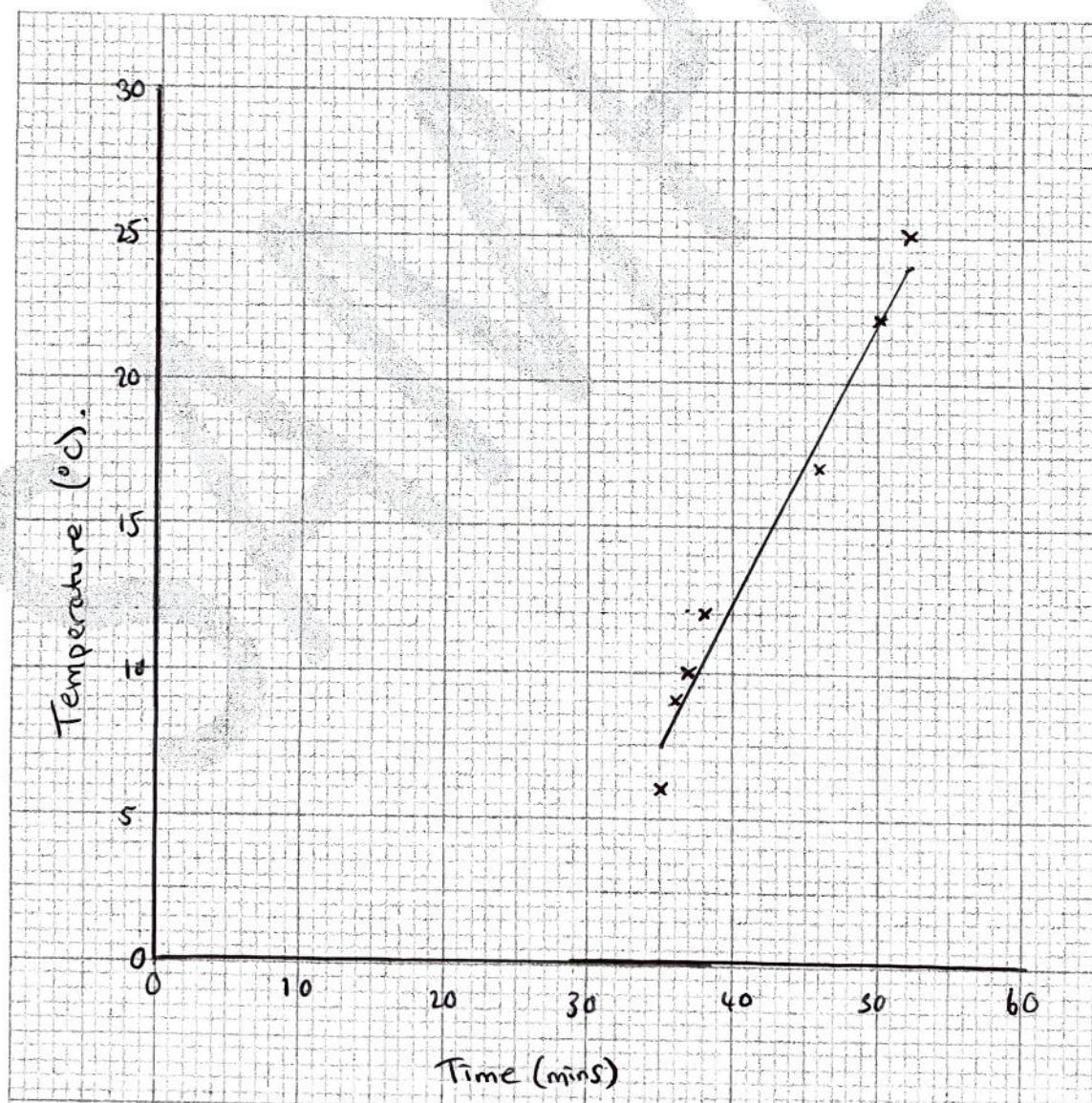
He collects some information on the days he has completed a 5 km run.

Outside temperature	Time taken to run 5 km
17°C	46 minutes
12°C	38 minutes
25°C	52 minutes
9°C	36 minutes
10°C	37 minutes
22°C	50 minutes
6°C	35 minutes

Produce a scatter diagram to show Kyle's data.

[2 marks]

Time taken to run 5 km at different temperatures (°C)



## 4 (d) Use your scatter diagram in 4 (c).

Kyle wants to calculate his likely time to run the half marathon.

The half marathon is 13.1 miles long.

1 mile = 1.6 km

The forecast temperature for the race day is 15°C.

This is a formula used to predict the time (in minutes) it will take to run a race, based on the times achieved for a 5 km run:

$$\frac{D}{5} \times 1.12 \times t$$

Where:

D = distance (in km)

t = time to run 5 km (in minutes)

Calculate the predicted time for Kyle's half marathon.

Show your working.

[4 marks]

At 15°C, Kyle runs 5km in 43 minutes.

$$13.1 \text{ mi} \times 1.6 \text{ km/mi} = 20.96 \text{ km}$$

$$\frac{20.96}{5} \times 43 \times 1.12 = 201.89 \text{ mins.}$$

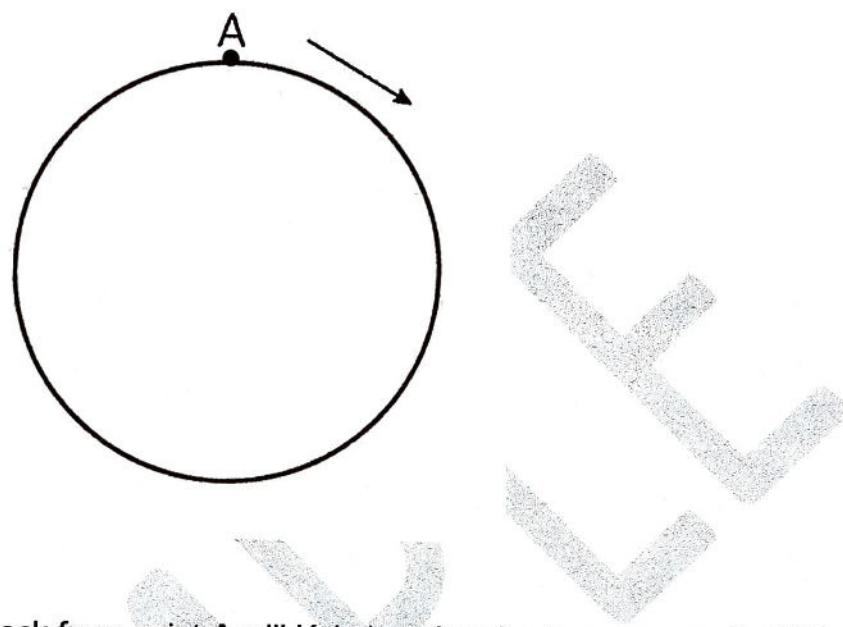
Your answer:

201.89 minutes

Please turn over

- 4 (e) Kyle goes to a circular athletics track for a 15 km training run.  
One lap of the track is 320 m

He runs in a clockwise direction, starting at point A.



How far along the track from point A will Kyle be when he has run exactly 15 km?  
Show your working.

[2 marks]

$$320 \text{ m} = 0.32 \text{ km}.$$

$$\frac{15}{0.32} = 46.875 \text{ laps.}$$

$$0.875 \times 320 \text{ m} = 280 \text{ m.}$$

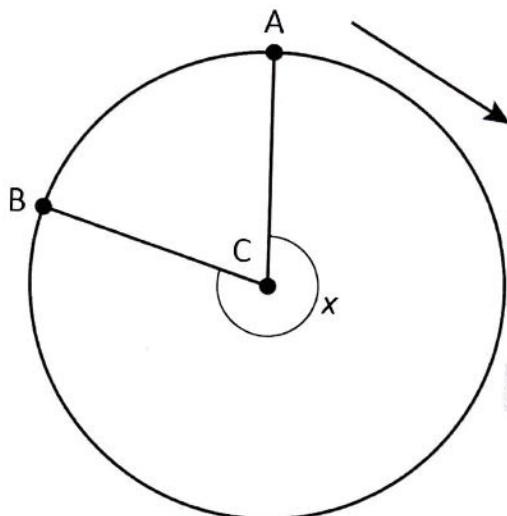
Your answer:

280

m

- 4 (f) A different runner starts at point **A** and stops at point **B** when he has run exactly 0.8 of a lap.

**C** marks the centre of the circular track.



Calculate the angle marked  $x$

**[2 marks]**

$$0.8 \times 360^\circ = 288^\circ$$

Your answer:

288 degrees

**[Total marks: 15]**

**This is the end of the assessment.**

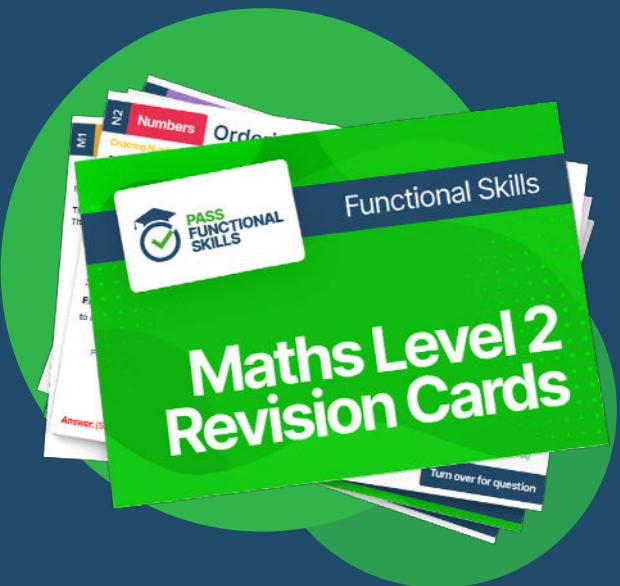




**PASS  
FUNCTIONAL  
SKILLS**



Functional Skills Maths  
Level 2 Practice Papers



Functional Skills Maths  
Level 2 Revision Cards



Functional Skills English Level 2  
Practice Papers & Revision Cards



Functional Skills Maths  
Level 2 Pocket Revision Guide

Or visit  
**passfunctionalskills.co.uk**