

Duration: 1 hour 20 minutes  
Total marks: 45 marks

# .CG Maths.

Worked Solutions

## SECTION 2 – CALCULATOR PERMITTED

Candidate name (first, last)

First

Last

Candidate enrolment number

Date of birth (DDMMYYYY)

Assessment date (DDMMYYYY)

Centre number

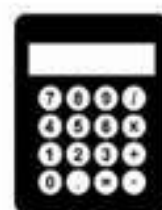
Candidate signature and declaration\*

- If you have used any additional answer sheets write the number of additional sheets in this box.
  - Please ensure that you **staple** additional answer sheets to the **back** of this booklet, clearly labelling them with your full name, enrolment number, centre number and date in BLOCK CAPITALS.
  - You must use a black or blue pen. You may use a pencil for charts and diagrams.
- \*I declare that I had no prior knowledge of the questions in this assessment and that I will not share information about the questions.**

Please check that your name is correctly printed on the candidate barcode label. If not, please tell the invigilator before the start of the exam.

You should have the following for this assessment

- a pen with black or blue ink.
- a pencil
- an eraser
- a 30cm ruler
- a calculator.



You must **NOT** use a protractor.

**General instructions**

- Read through each question carefully.
- You may use a dictionary.
- Show your working out (where required).
- Write all your working out and answers in this booklet.
- Check your calculations and check that your answers make sense.
- There are additional pages at the back of this booklet if you run out of space or ask the invigilator if you need additional sheets of paper.

Please note that these worked solutions have neither been provided nor approved by City & Guilds and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

Anything written in green in a cloud doesn't have to be written in the exam.

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

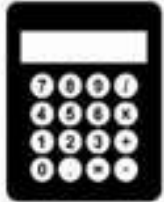
If you find any mistakes or have any requests or suggestions, please send an email to [curtis@cgmaths.co.uk](mailto:curtis@cgmaths.co.uk)

## SECTION 2 – CALCULATOR PERMITTED

There are **45** marks in this section.

You should check all your work as you go along.

You may use a calculator.



# .CG Maths.

Q1

What is 35 as a fraction of 490? Give your answer in its simplest form.

$$35/490 = 1/14$$

The calculator simplifies the fraction

$$\frac{1}{14}$$

(1 mark)

Q2

$$1\frac{3}{8} + 3\frac{9}{16} =$$

(tick one box)

A  $4\frac{1}{2}$

B  $4\frac{3}{8}$

C  $4\frac{3}{4}$

D  $4\frac{15}{16}$

Type into the calculator and convert the answer to a mixed fraction

(1 mark)

# .CG Maths.

Q3

Which of these has the smallest value?

(tick one box)

A  $6.048 \div 24 = 0.252$

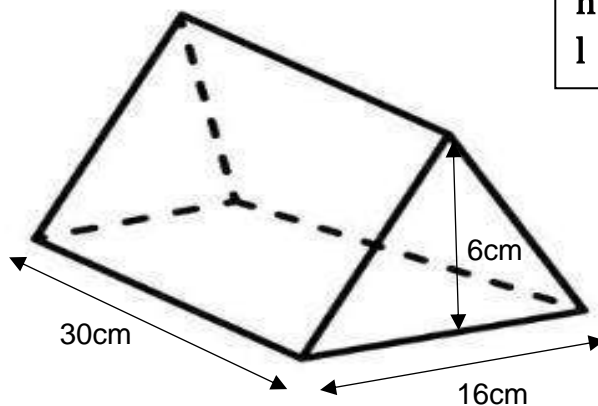
B  $0.095 \div 5 = 0.019$

C  $1.032 \div 12 = 0.086$

D  $1.274 \div 7 = 0.182$

(1 mark)

Q4



$$v = \frac{bhl}{2}$$

v = volume in  $\text{cm}^3$

b = base in cm

h = height in cm

l = length in cm

Diagram not to scale

What is the volume of this triangular prism?

$$\frac{1}{2} \times 16 \times 6 \times 30$$

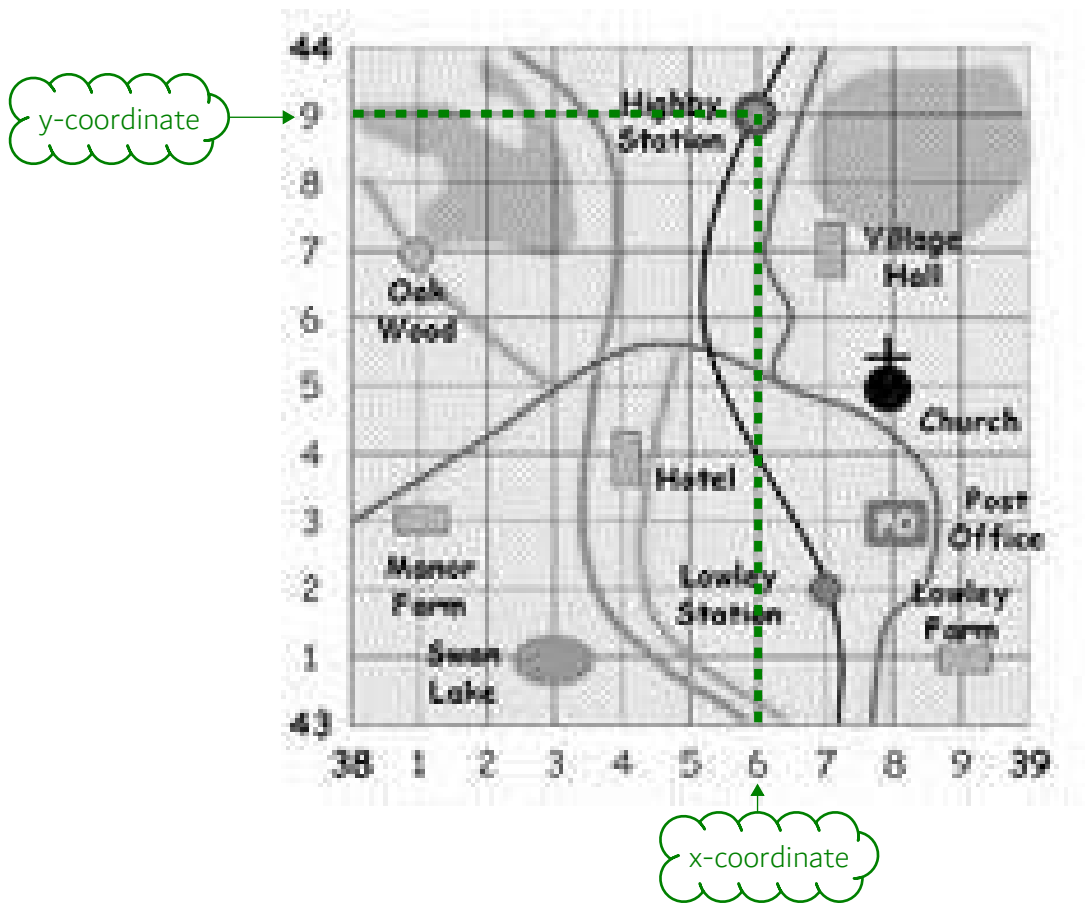
Volume of prism = cross sectional area x length. The length is 30cm. The cross section is the triangle at the front. Area of triangle =  $\frac{1}{2} \times \text{base} \times \text{height}$ . The base of the triangle is 16cm and the height is 6cm

$$\underline{1440} \text{ cm}^3$$

(1 mark)

# .CG Maths.

Q5



What is the coordinate for Highby Station?

(tick one box)

x-coordinate first

- A 396449
- B 386439
- C 439386
- D 449396

(1 mark)

# .CG Maths.

Q6

A woman is going to Spain for a holiday.

She wants to book a hotel online.

She finds a hotel that charges €84 euros per night.

She thinks this will be about £100 per night.

Exchange rate pound to euro  $\text{£1} = \text{€1.12}$

Is she right? Explain your answer.

Is she right? (tick one box) Yes  No

Explanation

$$\frac{84}{1.12}$$

€84 is £75

Every €1.12 is £1 so dividing the €84 by 1.12 converts it into pounds

(1 mark)

# .CG Maths.

Q7

An apprentice hairdresser needs to prepare a solution to colour a client's hair.

The client wants high lift shades.

The apprentice hairdresser measures out 75ml of developer.

Hair shade	Ratio of hair colour to developer
Grey coverage and fashion shades	1 : 1
High lift shades	1 : 1.5
Hair lightener	1 : 2

What amount of hair colour should she measure out?

Show your working

$$\frac{75}{1.5}$$

1.5 parts of the ratio represents the 75ml of developer so dividing the 75 by 1.5 works out the value of 1 part, which represents the hair colour

\_\_\_\_\_ 50 \_\_\_\_\_ ml

(2 marks)



# .CG Maths.

Q8

A woman has a new fitness watch.

She uses this formula to calculate her **step length**.

$$\text{Step length}(\text{feet}) = \frac{\text{a measured distance in feet}}{(\text{the number of steps taken})}$$

Her **measured distance** was **20 feet** and the number of **steps taken** was **16**.

In her first week she walks 67118 steps.

She wants to know how many kilometres she walked in the first week.

$$1 \text{ foot} = 0.0003048 \text{ km}$$

What distance did she walk?

**Show your working**

$$\frac{20}{16} \times 67118 \times 0.0003048$$

20/16 works out the step length in feet. Multiplying this by the number of steps works out the distance she walked in feet.  
Multiplying this by 0.0003048 converts the distance into kilometres

Distance walked 25.6 km

(3 marks)

# .CG Maths.

Q9

A secretary needs to order 8 boxes of paper clips. Each box costs £7.67

The table below shows the discount offered on large orders.

Total order	Discount
£40 - £54.99	5%
£55 - £79.99	6.5%
£80 or more	8%

What amount will the secretary have to pay?

**Show your working**

$$8 \times 7.67 = 61.36$$

Working out the normal price of 8 boxes of paper clips

$$61.36 \times \frac{100 - 6.5}{100}$$

The normal price is between £55 and £79.99 so there is a 6.5% discount. 100 - 6.5 works out the percentage it decreases to. Putting this over 100 converts it into a fraction which reduces by 6.5% when multiplied by

The answer of 57.3716 is rounded to the nearest penny

£ 57.37

(3 marks)

# .CG Maths.

## Q10

The Chairperson of a committee needs to write a report for a council meeting.

She needs to compare the fly tipping incidents reported in the **local area** with the fly tipping incidents reported **nationally**.

### National Report

This year local authorities in England dealt with an **increase of 8%** of fly tipping incidents on those reported in last year.

This table shows the numbers of fly tipping incidents reported in the local area.

Year	Numbers of fly tipping incidents reported
Last year	11 193
This year	11 649

What will the Chairperson write in her report about the comparison between the local incidents and the national incidents? Explain your answer using figures.

### Show your working

$$\frac{11649 - 11193}{11193} \times 100 = 4.1\%$$

Percentage change = (new - original)/original x 100

### Explanation

The national incidents increased by a greater percentage than the local incidents

(4 marks)

## Q11

A golf coach wants to tell a beginner how he is performing.

He tells the beginner that he should be able to hit the ball 150 yards on average.

He tests the beginner and records the distance of each hit.

Distance travelled (d) in yards	Frequency
$135 \leq d < 140$	4
$140 \leq d < 145$	13
$145 \leq d < 150$	17
$150 \leq d < 155$	6

Is the beginner performing at the average level? Explain your answer using figures

**Show your working**

$$\frac{135+140}{2} \times 4 + \frac{140+145}{2} \times 13 + \frac{145+150}{2} \times 17 + \frac{150+155}{2} \times 6$$

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$$4+13+17+6$$

**Is the beginner performing at the average level?**

(tick one box) Yes  No

**Explanation**

The estimated mean distance is 145.625 yards

Adding the lowest and highest within each category then dividing by 2 works out the midpoint of each category. Multiplying these midpoints by the frequency of each category works out an estimate of the total distance of each category. Adding all of these totals together gives an estimate of the overall total distance. Dividing this by the total frequency works out an estimate of the mean distance

**(5 marks)**

# .CG Maths.

Q12

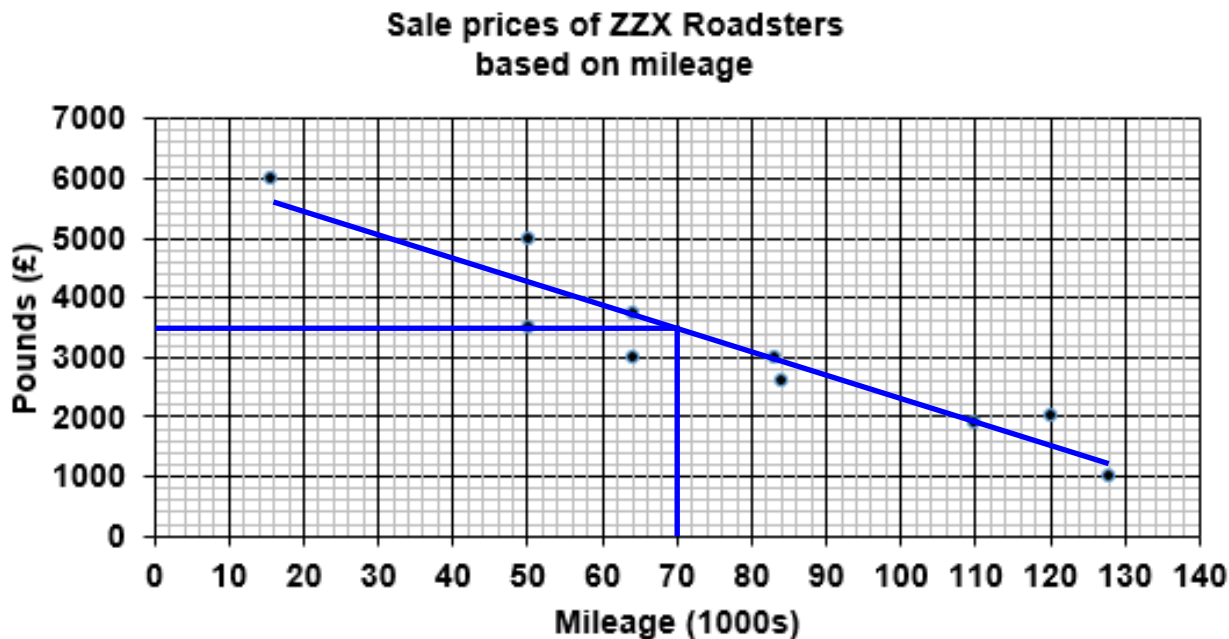
A garage sells used cars.

When a customer buys a car, the garage owner will offer an amount to pay for their old car.

A customer brings in a ZZX Roadster with a mileage of 70 000.

The garage owner estimates the value of this car based on the mileage.

He uses this website graphic to find this value.



He wants to make a first offer to the customer 30% below this value in order to make a profit when he resells it.

What amount should he offer the customer?

Explain your answer by drawing a trend line and marking the graph to show how you decided the amount.

Reading up from 70000 to the trend line then across works out an estimate of the value

Estimated value of the customer's car £ 3500

Show your working

$$3500 \times \frac{100-30}{100}$$

100 - 30 works out the percentage of the value the first offer is reduced to. Putting this over 100 converts it into a fraction, which reduces by 30% when multiplied by

First offer to customer £ 2450

(4 marks)

**Q13**

A 22-year-old man wants to apply for this job.

He wants to work out how much his annual take home pay will be.

**Staff required**  
for busy town centre retail store.

Shifts available 6am – 1pm  
Includes one hour break unpaid.  
6 days per week  
National Minimum Wage

**National Minimum Wage (NMW) rates**

NMW (age)	Apprentice	16-17 years	18-20 years	21-24 years
Rate per hour (£)	£3.90	£4.35	£6.15	7.70

He knows he has to pay income tax and national insurance and what is left is his take home pay.

**TAX INFORMATION**

**Income tax is taken from your earnings after your personal allowance has been deducted.**

**Income Tax rates and bands**

Band	Taxable income	Tax rate
Personal allowance	up to £12 500	0%
Basic rate	£12 501 to £50 000	20%
Higher rate	£50 001 to £150 000	40%

He is told that his national insurance will be about £600 National Insurance in the year.

What will the man's annual pay be?

# .CG Maths.

Show your working.

$$(13-6-1) \times 7.70 \times 6 \times 52$$

1pm is 13:00 and 6am is 6:00 in 24 hour time. Subtracting these works out how long each shift is. Subtracting the hour unpaid break works out how many paid hours there are each day. The minimum wage per hour for a 22-year-old is £7.70 so multiplying the number of paid hours per day by this gives the amount paid per day. Multiplying this by the 6 days worked each week gives the pay each week. Multiplying this by the 52 weeks in a year works out the pay each year before tax and national insurance has been taken away

$$(14414.40 - 12500) \times \frac{20}{100}$$

Subtracting the personal allowance from the pay each year works out how much money is taxable. The rate is 20% and no higher as his earnings aren't as high as £50000. Putting the 20 over 100 converts the percentage into a fraction, which finds 20% when multiplied by. This calculation finds the amount of income tax he needs to pay

$$14414.40 - 382.88 - 600$$

Subtracting the income tax and the national insurance from the annual pay leaves the take home pay

£

13431.52

(6 marks)

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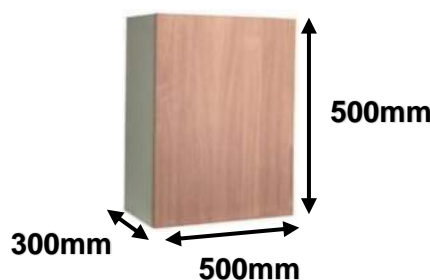
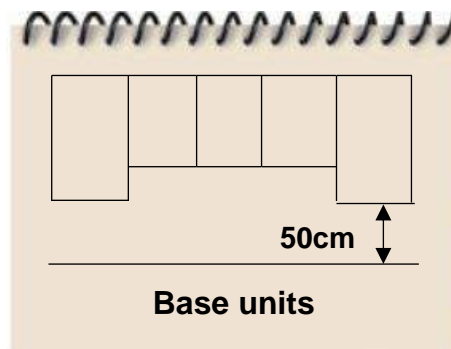
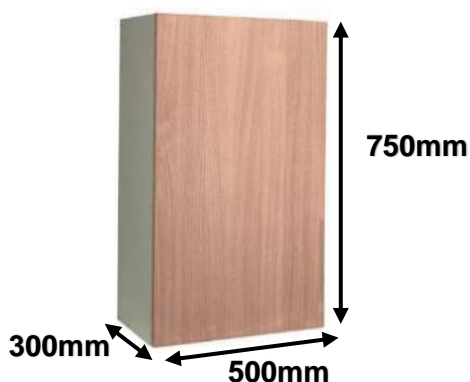
Q14

A kitchen designer needs to draw a scale plan for a customer's new kitchen.

The customer gives the kitchen designer this sketch to show how she would like the cupboards to fit above the worktop.

The base of the large cupboard needs to be 50cm above the top of the worktop.

Diagram not to scale



Use the scale plan of the elevation of the kitchen wall to show where the kitchen designer should draw the cupboards.

**Space for working**

$$50 \div 25 = 2$$

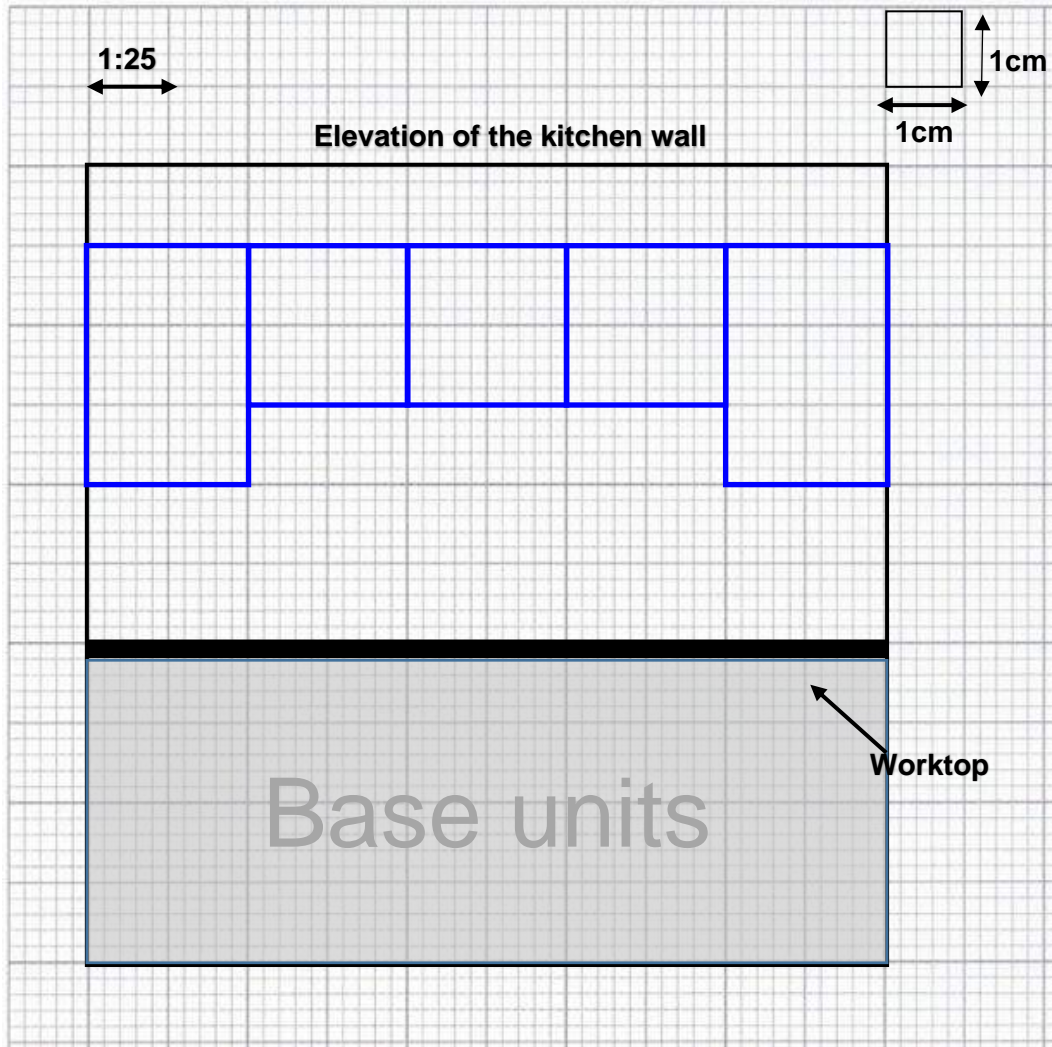
$$\frac{500}{10} \div 25 = 2$$

$$\frac{750}{10} \div 25 = 3$$

The 25 parts which represent the real lengths is 25 times greater than the 1 part which represents the elevation. Therefore dividing each of the real lengths in centimetres by 25 works out how many centimetres represent them on the elevation. There are 10mm in 1cm so dividing the lengths in millimetres by 10 converts them into centimetres



# .CG Maths.



(6 marks)

# .CG Maths.

## Q15

A health club conducts a survey to compare the average number of hours of sleep of members.

Members report their results each week.

A woman takes part in this survey. She wears a fitness band, which records the number of hours she sleeps.

She wants to compare her own results week by week.

Last week she slept a mean time of 5 hours 19 minutes with a range of 4 hours 49 minutes.

This is the record for this week.

This week	Duration of sleep
Monday	8 hours 22 minutes
Tuesday	6 hours 49 minutes
Wednesday	5 hours 59 minutes
Thursday	5 hours 49 minutes
Friday	6 hours 44 minutes
Saturday	7 hours 16 minutes
Sunday	5 hours 55 minutes

What are the results that the woman reports to the health club?

What comparison can she make between her own results?

Make **two** comments using figures.

### Show your working

$$\frac{8^{\circ}22' + 6^{\circ}49' + 5^{\circ}59' + 5^{\circ}49' + 6^{\circ}44' + 7^{\circ}16' + 5^{\circ}55'}{7} = 6\text{h } 42\text{m}$$

Mean = total/number, where total is the total amount of time spent asleep and number is the number of days

$$8^{\circ}22' - 5^{\circ}49' = 2\text{h } 33\text{m}$$

Range = largest - smallest

### Comment 1

Mean amount of sleep has increased

Time can be put into the calculator and a decimal number of hours can be converted to time

### Comment 2

The range of the amount of sleep has decreased

(6 marks)