Perth Academy

Mathematics

Intermediate 1

2001

Paper 1

Non-Calculator

Answers

1. (a) Find 7.35×8.

$$\begin{array}{r} {}^2 7.{}^4 35 \\ \times\ 8 \\ \hline 58.80 \\ \hline \end{array}$$

Remember $7 \times 8 = 56$
So answer should be about 56.
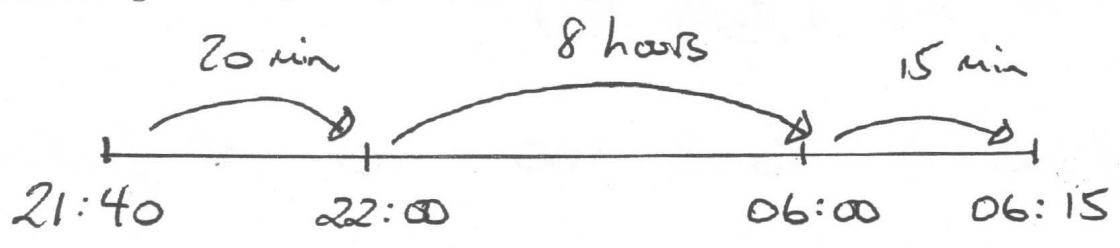Good way to check

1

(b) Find $\frac{3}{4}$ of £82.

$$\frac{1}{4} = \frac{82}{4} \Rightarrow 4\overline{)82.^2 0}$$

$$\begin{array}{r} 20.5 \\ 4\overline{)82.^2 0} \end{array}$$

$$\frac{3}{4} = 20.5 \times 3 = 61.5$$

1

2. Part of the timetable of the overnight bus from Stirling to London is shown opposite.

Stirling (depart)	2140
London (arrive)	0615

How long does the journey from Stirling to London take?

20 min   8 hours   15 min

21:40   22:00   06:00   06:15

Total time = 8 hours 35 min

1

3. Eight jars of jam can be made from 2 kilograms of raspberries.
How many jars of jam can be made from 5 kilograms of raspberries?

Ratio   Jars   Rasps

So 1kg makes 4 jars

$$\div 2 \left(\begin{array}{cc} 8 & 2 \\ 4 & 1 \end{array} \right) \div 2$$

$$\times 5 \left(\begin{array}{cc} 20 & 5 \end{array} \right) \times 5$$

2

∴ 5kg will make 20 jars.

4. Jenna is buying a car. The cash price is £11 500. It can be bought on hire purchase by paying a deposit of 20% of the cash price and 36 instalments of £300.

Find the total hire purchase price of the car.

H.P. Cost. $\left(20\% \text{ of } £11\,500 \right)$

$+ \left(36 \times £300 \right)$

$20\% = \frac{20}{100} = 0.2 \times £11\,500 = £2300$

(Remember $10\% = £1,150$ take off a zero, So 20% is double this)

$36 \times £300 \Rightarrow 36 \times 3 \times 100 = 108 \times 100 = £10\,800$

Total Cost $= £2300 + £10\,800 = £13\,100$ 3

5. Solve algebraically the equation

$$7b - 6 = 3b + 38.$$

$7b - 3b - 6 = 3b - 3b + 38 \qquad \left(-3b \text{ each side} \right)$

$4b - 6 + 6 = 38 + 6 \qquad \left(+6 \text{ each side} \right)$

$4b = 44 \qquad \left(\div 4 \text{ each side} \right)$ 3

$b = 11$

6. During a period of 30 days the temperature at a weather station is recorded each day.

The frequency table below shows these temperatures.

Temperature (°C)	Frequency	Temperature × Frequency
−3	1	−3
−2	2	− 4
−1	4	− 4
0	2	0
+1	6	6
+2	8	16
+3	3	9
+4	4	16

(a) Write down the modal temperature. $\left(Modal = most common \right)$

$+2$ was the modal score

1

(b) Complete the table above and find the mean temperature.
Give your answer as a decimal.

$$Mean = \frac{Total\ of\ (Temp \times freg)}{Total\ of\ freg}$$

3

$$= \frac{36}{30} = 1.2°C$$

7. (*a*) Multiply out the brackets and simplify

$$8w + 3(2 - w).$$

$$8w + 6 - 3w$$

$$= 5w + 6$$

2

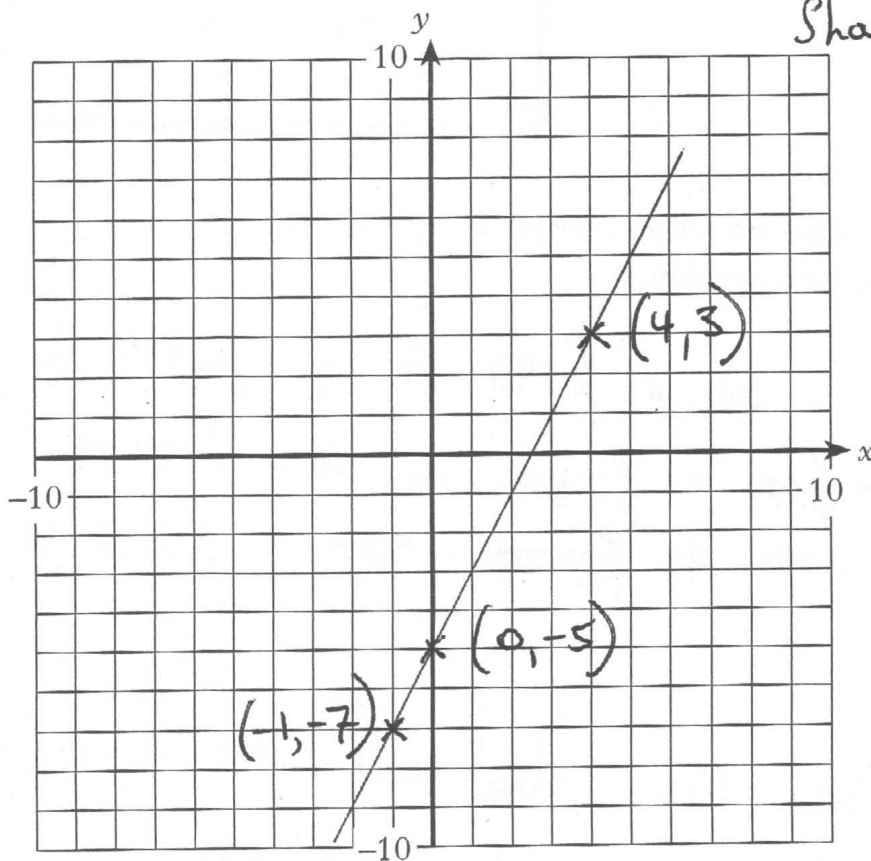(*b*) Factorise $\quad 45 + 5a.$

Common factor of 5

$$5(9 + a).$$

2

8. (a) Complete the table below for $y = 2x - 5$. ↙

Substitute these values into equation 2

x	−1	0	4
y	−7	−5	3

$(-1, -7)$ $(0, -5)$ $(4, 5)$

(b) Using the table in part (a), draw the graph of $y = 2x - 5$ on the grid.

Should be a straight line

$(4, 3)$

$(0, -5)$

$(-1, -7)$

2

9. The manager of the Central Hotel is buying new televisions for each of the hotel's 50 bedrooms. Two suppliers offer him the following deals.

ELECTRO

Televisions
£199·99 each

KOSTCUTS

Televisions
£210 each

* Get one free for
every ten you buy

Which supplier offers the lower price for 50 televisions?
You must show your working.

ELECTRO   50 × £199.99 = £9999.50

(Remember 50 × £200 = £10000 so 50 × £199.99
        is the same as £10000 − 50p = £9999.50)

KOSTCUTS

If I buy 40 which will cost 40 × £210

= 4 × 21 × 10 × 10 = £8400

will get 4 free.

Still need another 6 so 6 × £210 = £1260

So total cost = £8400 + £1260

= £9660

4

Kostcuts is cheaper.

10. Use the formula below to find the value of D when $b = 3$ and $k = 7$.

$$D = \sqrt{b^2 + k}$$

$$D = \sqrt{3^2 + 7}$$

$$D = \sqrt{9 + 7} = \sqrt{16}$$

$$D = 4.$$

3

11. (*a*) Find $7 - (-2)$.

$$7 - (-2) = 7 + 2 = 9$$

(Remember signs the same +, signs different −) **1**

(*b*) Find $-24 \div (-3)$.

$$-24 \div -3 = 8$$

1

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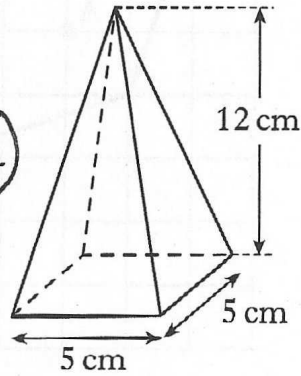
Mathematics

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Paper 2

Calculator

Answers

1.

$$\boxed{\text{Volume of pyramid} = \tfrac{1}{3}\text{of (area of base} \times \text{height)}}$$

(a) Use the formula above to work out the
volume of this square-based pyramid.

12 cm

5 cm

5 cm

Volume $= \tfrac{1}{3} \times \left(\text{area of base} \times \text{height}\right)$

$= \tfrac{1}{3} \times (5 \times 5) \times 12$

$= \tfrac{1}{3} \times 25 \times 12 = 100 \, cm^3$

3

(b) This cuboid has the same volume as the
pyramid shown above.
Find the length of the cuboid.

2 cm

4 cm
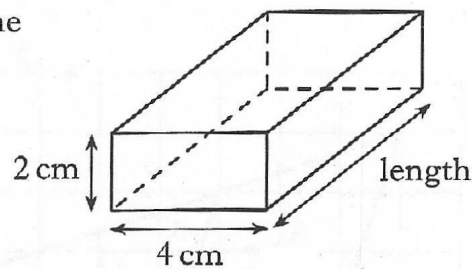
length

Volume of cuboid $= \text{length} \times \text{width} \times \text{height}$

So $\quad 2 \times 4 \times \text{length} = 100$

$8 \times \text{length} = 100$

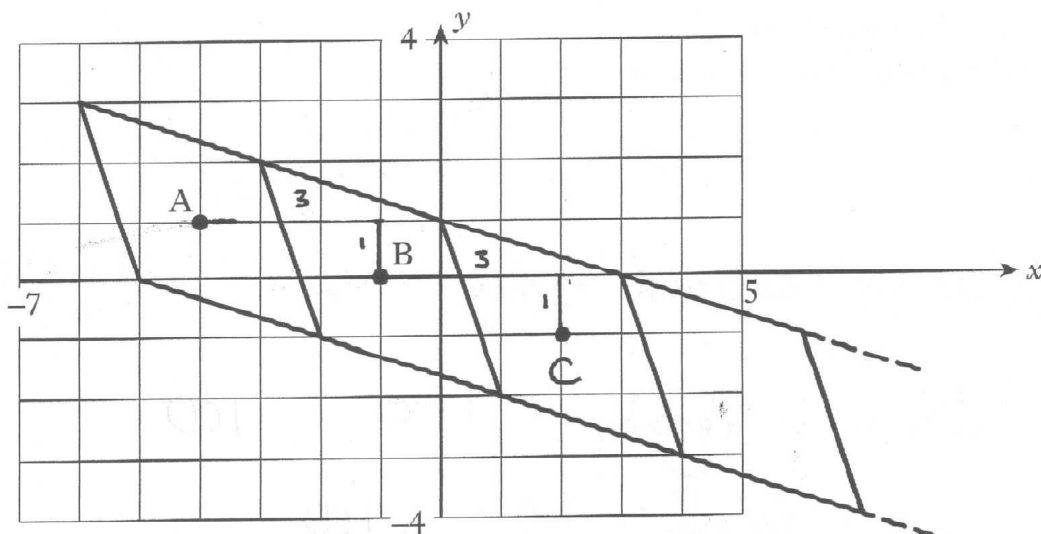So $\text{length} = \dfrac{100}{8} = 12.5 \, cm$

2

2. (a) Write down the coordinates of the point A marked on this diagram.
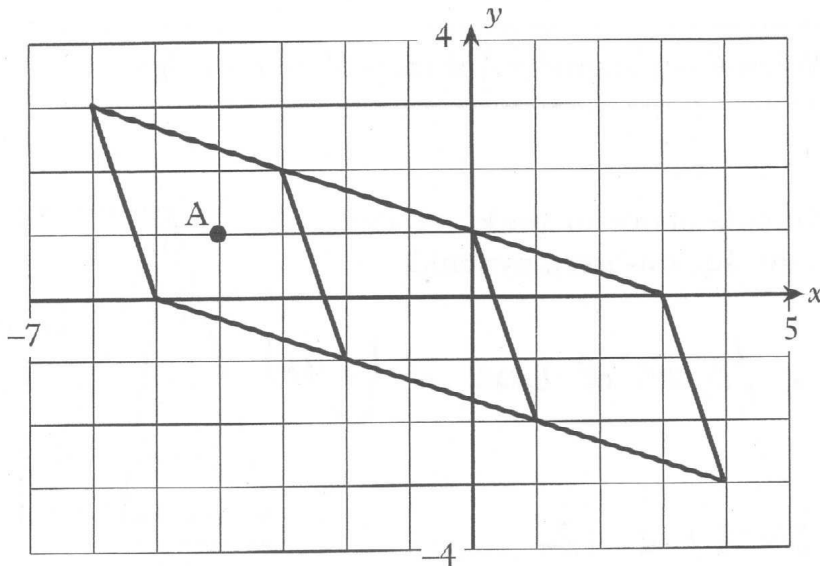
Point A is −4 in the x direction and 1 in the y direction

So A(−4, 1)

1

(b) The pattern of parallelograms continues.

To get from A to B we go along 3 and down 1
This will be repeated.

A is the centre of the first parallelogram.

B is the centre of the second parallelogram.

Find the coordinates of the centre of the sixth parallelogram.

$$\underset{(-4,1)}{A} \quad \underset{(-1,0)}{B} \quad \underset{(2,-1)}{C} \quad \underset{(5,-2)}{D} \quad \underset{(8,-3)}{E} \quad \underset{(11,-4)}{F}$$

2

3. A group of swimmers record

 • the number of lengths they swim in each training session
 • their personal best time (in seconds) for swimming 100 metres
   in competition.

The scattergraph shows the results.

Personal Best Time for 100 metres (seconds)
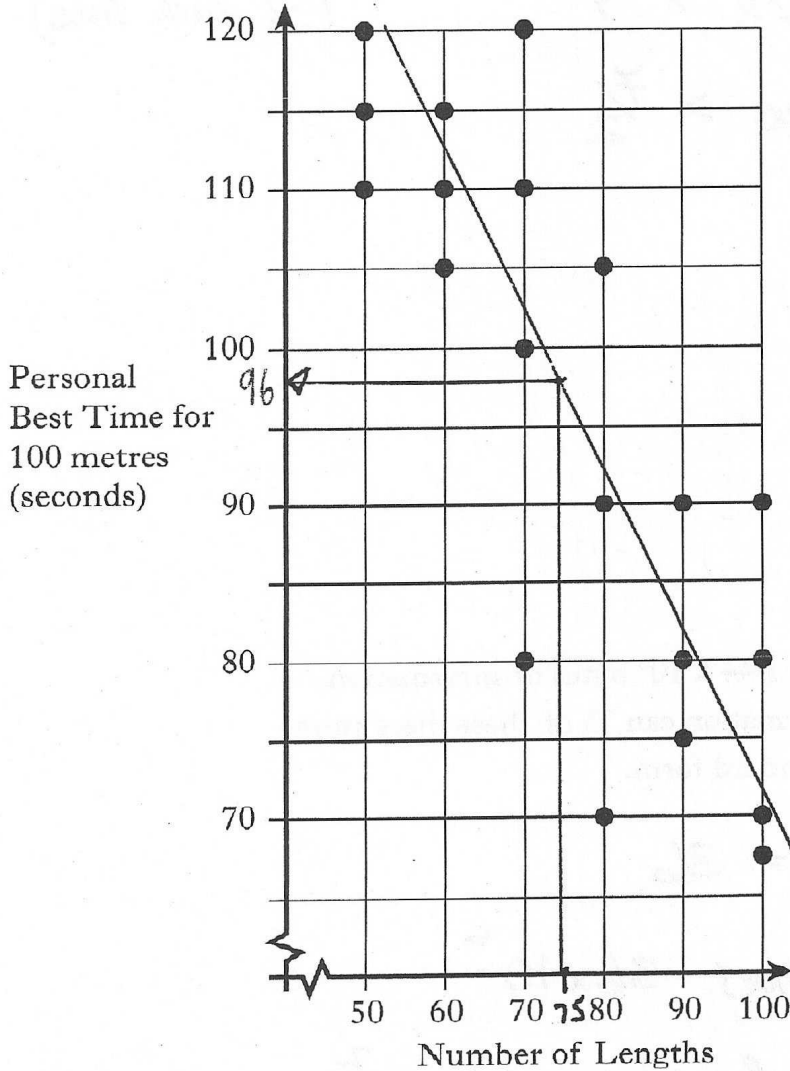
line of best fit should go through the middle of the points but does not have to go through any points

(a) Draw a line of best fit through the points on the graph.   1

(b) Use the graph to estimate the personal best time of a swimmer who swims 75 lengths in each training session.

Personal best time will be about 96s.

will vary depending on your line of best fit.

1

4. Solve algebraically the inequality

$$2x + 3 > 10.$$

$$2x + 3 - 3 > 10 - 3 \quad (-3 \text{ each side})$$

$$2x > 7 \quad (\div 2 \text{ each side})$$

$$x > \frac{7}{2}$$

2

5. A compact disc can store 1.44×10^6 bytes of information. How many bytes of information can 25 of these discs store? Write your answer in standard form.

$$1.44 \times 25 = 36$$

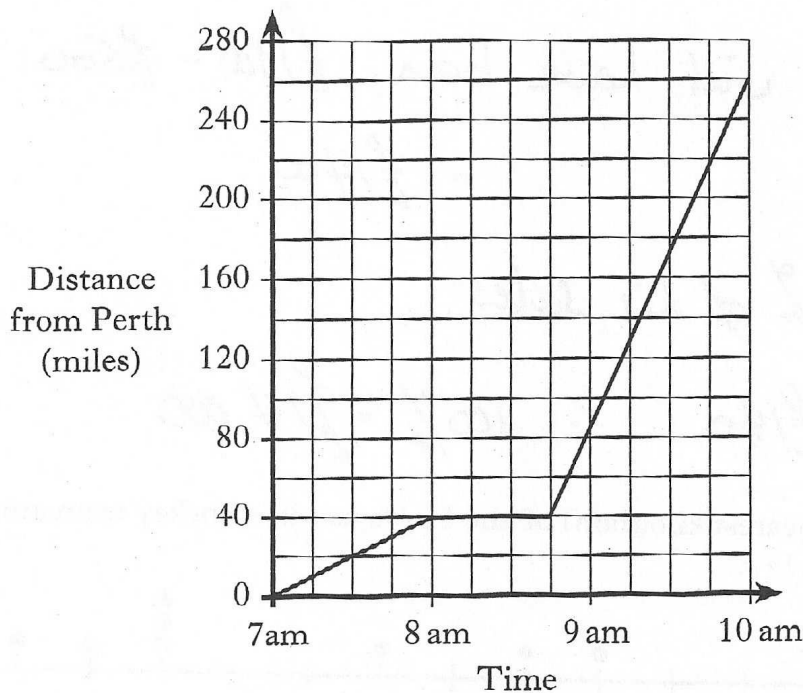So this gives 36×10^6

In standard form is 3.6×10^7

3

This number must always be between 1 and 10

6. Andrea leaves home in Perth at 7 am and drives 40 miles to Edinburgh Airport where she then catches a flight to Dublin. Her journey is shown on the graph below.

(a) How long does she spend waiting at Edinburgh Airport?

8am to 8:45 am

So 45 minutes.

1

(b) Calculate the average speed of her flight from Edinburgh to Dublin.

Time 8:45 → 10:00 So 1hr 15 minutes

Distance 260 - 40 = 220 miles

$Speed = \dfrac{Distance}{Time} = \dfrac{220}{1.25} = 176$ mph

(Remember 15 minutes
  is 1/4 of an hour)

4

7. Walter is a double glazing salesman.

Each month he earns £500 **plus** 5% commission on all his sales.

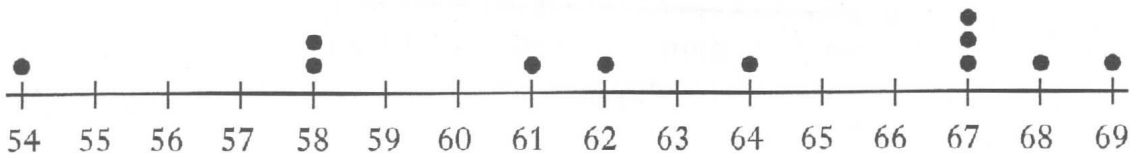Calculate the value of his sales in a month when his **total earnings** were £1900.

Commission will have been £1900 − £500

= £1400

So £1400 is 5% of his sales.

So 1% = £140   ∴ 100% = £14 000

3

8. The weights (to the nearest kilogram) of the 11 players in a hockey team are shown on the scale below.

(a) What percentage of the team weighs less than 60 kg?
Give your answer correct to 1 decimal place.

11 players altogether. 3 are below 60 kg

So 3/11 × 100 = 27·3 %.

4

(b) Write down the median weight of the team.

(Median = middle value when in order)

So 64 kg is the median value

1

(c) If another player is added to the scale the new median is 65 kg. What is the weight of this player?
Explain your answer.

If the middle value is 65, then the new player must weigh 66 kg

2

9. The box office takings at cinemas in the UK and the USA from showing "The Spartans" are shown below.

> **"THE SPARTANS"**
> **Box Office Takings**
> UK   £10 230 000
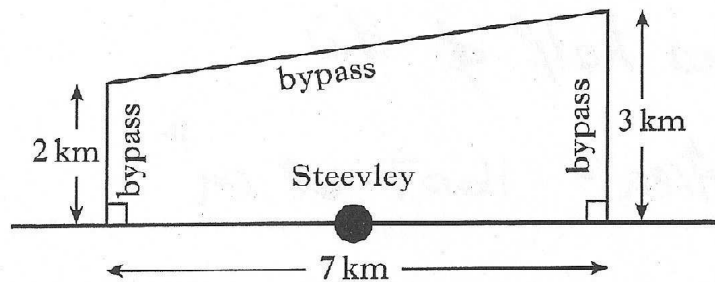> USA $15 800 000

Exchange Rate: £1 = $1·52

Change the box office takings in the USA to pounds sterling.
Give your answer to the nearest thousand pounds.

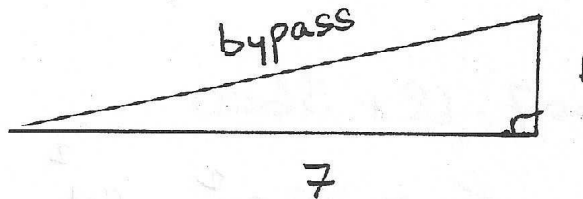$$\frac{15\ 800\ 000}{1\cdot52} = £10\ 394\ 737$$

$$= £10\ 395\ 000$$

3

10. A bypass is being built to reduce the traffic passing through Steevley as shown in the diagram.

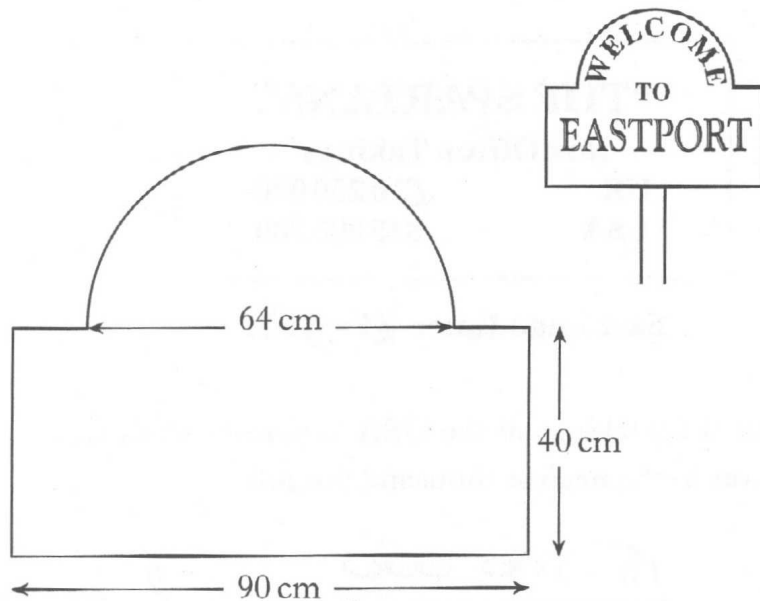Calculate the total length of the bypass.
Do not use a scale drawing.

* Pythagoras needed.

bypass

7

$$\text{bypass} = \sqrt{7^2 + 1^2} = \sqrt{50} = 7\cdot07\ km$$

$$\text{Total length} = 2 + 3 + 7\cdot07 = 12\cdot07\ km$$

11. This sign is in the shape of a rectangle and a semi-circle.

64 cm

40 cm

90 cm

Calculate the area of the sign.

Give your answer to the nearest square centimetre.

Semi Circle — area of circle

$$A = \pi r^2 = 3.14 \times 32^2 = 3215.36$$

Only need half of this

So Area = 1607.68 cm^2

Rectangle.

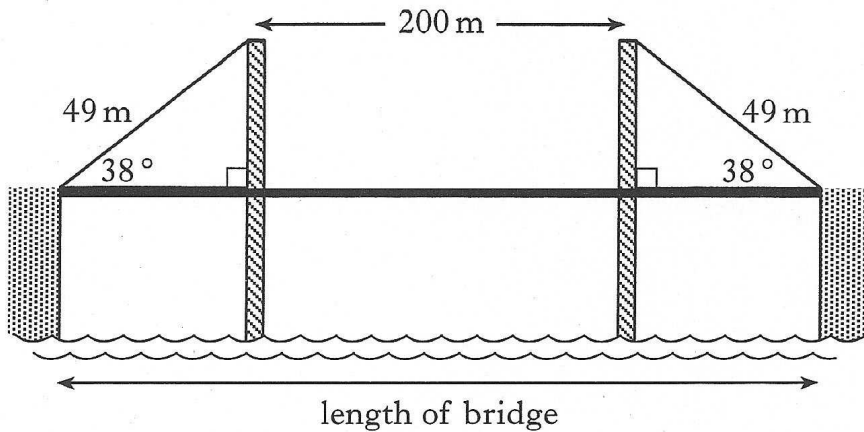$$Area = l \times b = 40 \times 90 = 3600 \text{ cm}^2$$
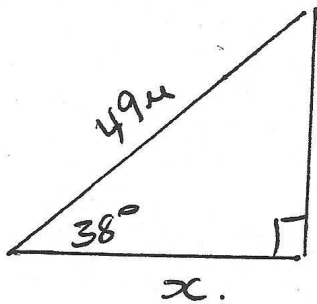
Total Area = 1607.68 + 3600

= 5207.68 cm^2 cm^2

Rounds to 5208 cm^2

5

12. The towers of a bridge are 200 metres apart.

Steel cables of length 49 metres are used to support the bridge at both ends.

The cables make an angle of 38° with the bridge.

length of bridge

Find the total length of the bridge.

Need SOHCAHTOA.

$$\cos 38° = \frac{x}{49}$$

$$\therefore x = \cos 38° \times 49m$$

$$= 38.6m$$

Total length $= 38.6 + 200 + 38.6$ m

$$= 277.2 m$$

4