

1 The heel of a shoe exerts a pressure of 198 pounds per square inch.

Convert this pressure into kilograms per square centimetre.

Use

1 pound = 0.45 kilograms

1 square inch = 6.25 square centimetres

[3 marks]

$$\frac{198 \cancel{\text{pound}}}{1 \cancel{\text{inch}^2}} \times \frac{0.45 \text{ kg}}{1 \cancel{\text{pound}}} \times \frac{1 \cancel{\text{inch}^2}}{6.25 \text{ cm}^2}$$

$$= \frac{198 \times 0.45}{6.25} \text{ (1)}$$

$$= \frac{89.1}{6.25} = 14.256 \text{ (1)}$$

Answer 14.256 kg/cm²

- 2 Tom and Adil are the two runners in a 200-metre race.
Tom completes the race in 24 seconds.
Adil completes the race at an average speed of 28.8 kilometres per hour.

Who wins the race?

You **must** show your working.

[3 marks]

speed in m/s :

$$v_{\text{Tom}} = \frac{200 \text{ m}}{24 \text{ s}} = 8.33 \text{ ms}^{-1} \quad (1)$$

$$v_{\text{Adil}} = \frac{28.8 \text{ km}}{1 \text{ hour}} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{1 \text{ hour}}{3600 \text{ s}}$$
$$= 8 \text{ ms}^{-1} \quad (1)$$

Tom wins.

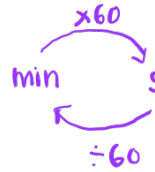
(1)

Answer Tom

3

Concrete from a truck is poured at 10.9 kg **per second** for 30 minutes.

$1000 \text{ kg} = 1 \text{ tonne}$



Is more than 20 tonnes of concrete poured?

Tick a box.

Yes

☐

No

☒
You **must** show your working.**[4 marks]**

$$\text{Concrete poured : } \frac{10.9 \text{ kg}}{1 \text{ s}} \times (30 \times 60) \text{ s}$$

$$= 10.9 \text{ kg s}^{-1} \times 1800 \text{ s}$$

$$= 19\,620 \text{ kg}$$

(3)

$$\text{in tonnes : } 19\,620 \text{ kg} \times \frac{1 \text{ tonne}}{1000 \text{ kg}}$$

$$= 19.62 \text{ tonnes}$$

(1)

which is less than
20 tonnes.

4

Town A has

a population of 84 000

an area of 7 **square miles**.Town B has a population density of 4695 people per **square kilometre**.

$$\text{Population density} = \frac{\text{population}}{\text{area}}$$

Which town has the greater population density?

Use 1 square mile = 2.6 square kilometres

Tick a box.

Town A ☐Town B ☒

Show working to support your answer.

[3 marks]

$$\text{Town A area} = 7 \times 2.6 \text{ square km}$$

$$= 18.2 \text{ square km}$$

$$\text{Town A population density} = \frac{84000}{18.2} = 4615 \text{ people per Square km}$$

$\therefore$ Town B has greater population density (1)