Answers of Pack 3- (Unit 3)

Exercise 3.1B Unbalanced forces

1 Ticks by 'a boat will slow down', and 'a football will change direction'.

2 a contact force and weight

b driving force and friction

c start to move forward/get faster/speed will increase

Exercise 3.1C Changing direction

1 a Bird is flying at a constant speed and at a constant height.

b Force **A** increases (credit can be given to force **C** decreasing, although it can be pointed out that this is less likely).

c Force **D** increases; force **B** decreases.

2 arrow pointing to the right of the page

3 a Arrow on the string pointing toward the pole labelled F.

b Arrow at a tangent to the circle from the ball in the same direction as the rotation of the ball labelled D.

Topic 3.2 Speed

Exercise 3.2A Units of speed

1 a metre

b second

c m/s

2 It travels a distance of 60 km every hour.

3 distance = speed × time
= 260 000 × 2
= 520 000 km

Exercise 3.2B Calculating speed

1 **a** $\text{speed} = \frac{\text{distance}}{\text{time}}$ (or correct arrangement)

b m/s or metres per second

2 **a** $\text{speed} = \frac{\text{distance}}{\text{time}}$

$= \frac{70}{2}$

$= 35\,\text{m/s}$

b $\text{speed} = \frac{\text{distance}}{\text{time}}$

$= \frac{30}{2}$

$= 15\,\text{m/s}$

3 **a** $\text{speed} = \frac{\text{distance}}{\text{time}}$

$= \frac{450}{300}$

$= 1.5\,\text{m/s}$

b His walking speed may not be constant.

4 $\text{speed} = \frac{\text{distance}}{\text{time}}$

$= \frac{5400}{6}$

$= 900\,\text{km/h}$

Exercise 3.2C Calculating distance and time

1 **a** distance = speed × time

b $\text{time} = \frac{\text{distance}}{\text{speed}}$

2 **a** distance = speed × time

$= 45 \times 30$

$= 1350\,\text{m}$

b 2 minutes = 60 × 2

$= 120\,\text{s}$

distance = speed × time

$= 45 \times 120$

$= 5400\,\text{m}$

3 **a** $\text{time} = \frac{\text{distance}}{\text{time}}$

$= \frac{120}{4}$

$= 30\,\text{s}$

b distance travelled by Sofia = speed × time

$= 6 \times 60$

$= 360\,\text{m}$

distance travelled by Zara = speed × time

$= 4 \times 60$

$= 240\,\text{m}$

difference = 360 − 240

$= 120\,\text{m}$

4 **a** $\text{speed} = \frac{\text{distance}}{\text{time}}$

$= \frac{50}{2}$

$= 25\,\text{km/h}$

b The car is likely to be travelling slower than this or be stopped for some of the time, so to make the average work out at 25 km/h, there need to be some higher speeds.

Topic 3.3 Describing movement

Exercise 3.3A Distance/time graphs 1

1 the speed of an object

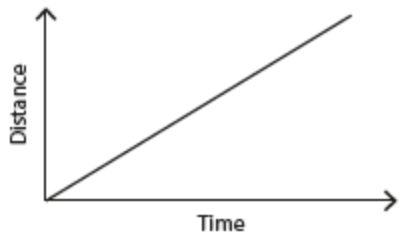
2 **a** C

b B

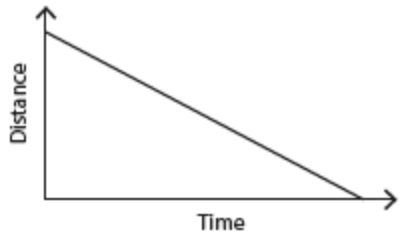
Exercise 3.3B Distance/time graphs 2

1 **a**

b



c



Exercise 3.3C Distance/time graphs 3

1 a

b i 10 hours

i $\text{speed} = \frac{\text{distance}}{\text{time}}$

$= \frac{3600}{4.5}$

$= 800 \text{ km/h}$

ii $\text{speed} = \frac{\text{distance}}{\text{time}}$

$= \frac{3600}{4}$

$= 900 \text{ km/h}$

Exercise 3.4B Calculating moments

1 moment = force × distance (from pivot)

2 a moment = force × distance
$= 15\,000 \times 5$
$= 75\,000$ (N m)

b i will increase the moment

ii will decrease the moment

3 pounds foot / pounds feet / foot pounds

Exercise 3.4C Moments, force and distance

1 a moment = force × distance

$$\text{force} = \frac{\text{moment}}{\text{distance}}$$
$$= \frac{40}{0.2}$$
$$= 200\ \text{N}$$

b Increasing distance will increase the moment using the same force.

2 $$\text{force} = \frac{\text{moment}}{\text{distance}}$$
$$= \frac{350}{0.35}$$
$$= 1000\ \text{N}$$

3 a moment = force × distance
$= 500 \times 2$
$= 1000$ Nm

b moment = force × distance

$$\text{force} = \frac{\text{moment}}{\text{distance}}$$
$$= \frac{1000}{400}$$
$$= 2.5\ \text{m}$$

Topic 3.5 Pressure between solids

Exercise 3.5A Describing pressure

1 $$\text{pressure} = \frac{\text{force}}{\text{area}}$$

2 tick in the box under shoes with high, sharp heel

3 a C

b $$\text{pressure} = \frac{\text{force}}{\text{area}}$$
It has the largest area but the force (or weight) is the same, so the pressure is smaller.

Exercise 3.5B Calculating pressure

1 A force of **20 N** acts on each (1) **cm²** of area.

2 $\text{pressure} = \frac{\text{force}}{\text{area}}$

$= \frac{15}{60}$

$= 0.25\ (\text{N/cm}^2)$

3 $\text{pressure} = \frac{\text{force}}{\text{area}}$

$\text{force} = \text{pressure} \times \text{area}$

$= 60 \times 0.5$

$= 30\ \text{N}$

4 pounds per square inch

Exercise 3.5C Variables affecting pressure

1 area (at end of thorn) is very small; pressure on skin will be large; pressure = $\frac{\text{force}}{\text{area}}$; other parts of stem would have larger area, so smaller pressure on skin

2 area in contact with ground is larger; so pressure is smaller; pressure = $\frac{\text{force}}{\text{area}}$

3 with sharp knife, area in contact with bread is smaller; so pressure is larger; pressure = $\frac{\text{force}}{\text{area}}$

4 End A has large area to decrease pressure on thumb when pushing, so less likely to be painful.

End B has small area to increase pressure on the surface, so more likely to go into surface.