**Day 70** **B Tier 10-a-day: Model Solutions**

## 1 Place value

Here are four digit cards.
1 4 8 3
Use all four cards to make the largest possible number.
Work out the difference between the largest and smallest possible numbers.

Largest: put the digits in order, biggest first: 8431
Smallest: put the digits in order, smallest first: 1348
8431 − 1348 = 7083
**Answer: 7083**

## 2 Pressure

A machine exerts a force of 40 N and causes a pressure of 5 N/m$^2$.
Work out the area in contact with the ground.

Area = force ÷ pressure
40 ÷ 5 = 8
**Answer: 8 m$^2$**

## 3 Fractions in simplest form

What fraction of £1.50 is 40p?
Give your answer in its simplest form.

£1.50 = 150 pence
$\frac{40}{150} = \frac{4}{15}$
**Answer: $\frac{4}{15}$**

## 4 Gradient and intercept

A straight line has equation y = 5x + 4
(a) Write down the gradient of the line.
(b) Write down the equation of a line that is parallel to this line and passes through the point (0, 6).

(a) The line is in the form y = mx + c, so the gradient m is the number in front of x
(b) Parallel lines have the same gradient, 5
It crosses the y-axis at 6, so c = 6
**Answer: (a) 5 (b) y = 5x + 6**

## 5 Trigonometry in context

Sam stands 55 m from the base of a tower on level ground. (Calculator)
The angle of elevation of the top of the tower is 20°.
Work out the height of the tower.
Give your answer correct to 1 decimal place.

The distance is the adjacent side and the height is the opposite side
$\tan 20° = \frac{h}{55}$
h = 55 × tan 20° = 20.018...
h = 20.0 m (1 d.p.)
**Answer: 20.0 m**

## 6 Percentage as a fraction of

(a) Priya scores 12 out of 125 in a quiz. Write this as a percentage.
(b) Write £1.20 as a percentage of £20.

(a) $\frac{12}{125} \times 100 = 9.6\%$
(b) Change both to pence: 120p and 2000p
$\frac{120}{2000} \times 100 = 6\%$
**Answer: (a) 9.6% (b) 6%**

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## 7 Distance, speed and time

A lorry leaves at 2:10 pm.
It travels 300 km at an average speed of 60 km/h.
At what time does it arrive?

Time = 300 ÷ 60 = 5 hours = 5 hours
2:10 pm + 5 hours = 7:10 pm
**Answer: 7:10 pm**

## 8 Area of an isosceles trapezium

An isosceles trapezium has parallel sides of length 37 cm and 13 cm.
Each sloping side is 15 cm long.
(a) Work out the perpendicular height of the trapezium.
(b) Work out the area of the trapezium.

(a) The difference in the parallel sides is 37 − 13 = 24, so each end sticks out 12
$h^2 = 15^2 - 12^2 = 225 - 144 = 81$, so h = 9
(b) Area = ½ × (37 + 13) × 9 = 225
**Answer: (a) 9 cm (b) 225 $cm^2$**

## 9 Average speed

A cyclist travels at 80 km/h for 0.5 hours and then at 36 km/h for 1.5 hours.
Work out its average speed for the whole journey.

Distance: 80 × 0.5 = 40 km and 36 × 1.5 = 54 km
Total distance = 94 km and total time = 2 hours
Average speed = 94 ÷ 2 = 47
**Answer: 47 km/h**

## 10 Inequalities on a number line

(a) Write down the inequality shown on the number line.
(b) Write down all the integers that satisfy the inequality.

(a) The circle at −1 is filled in and the circle at 3 is open
$-1 \leq x < 3$
(b) The whole numbers on the shaded part: −1, 0, 1, 2
**Answer: (a) $-1 \leq x < 3$ (b) −1, 0, 1, 2**