**Day 274** **B Tier 10-a-day: Model Solutions**

## 1 Time

(a) Write 8:10 pm using the 24-hour clock.
(b) Write 15:55 using am or pm.

(a) Add 12 to the hour: 8 + 12 = 20, so 20:10
(b) 15 − 12 = 3, so 3:55 pm
**Answer: (a) 20:10 (b) 3:55 pm**

## 2 Collecting like terms

Simplify $3p - q - 2p - 6q$

Collect the p terms: $3p - 2p = p$
Collect the q terms: $-q - 6q = -7q$
**Answer: $p - 7q$**

## 3 Simplifying ratios

Write the ratio 1.8 m : 480 cm in its simplest form.

Change to the same units: 1.8 m = 180 cm
180 : 480
Divide both by 60 to get 3 : 8
**Answer: 3 : 8**

## 4 Number machines

Here is a number machine.
Input → × 6 → + 3 → Output
(a) The input is 11. Work out the output.
(b) The output is 51. Work out the input.

(a) 11 × 6 = 66, then 66 + 3 = 69
(b) Work backwards: undo + 3 to get 48, then undo × 6 to get 8
**Answer: (a) 69 (b) 8**

## 5 Trigonometry: finding a side

Work out the length of x. (Calculator)
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Label the sides: x is the opposite and 23 cm is the hypotenuse
We use sin (opposite and hypotenuse)

$\sin 63° = \frac{x}{23}$

$x = 23 \times \sin 63° = 20.493...$
x = 20.5 cm (1 d.p.)
**Answer: x = 20.5 cm**

## 6 Equations with fractional answers

Solve $5x + 1 = 12$
Give your answer as a fraction in its simplest form.

Subtract 1 from both sides: $5x = 11$

Divide both sides by 5: $x = \frac{11}{5}$

**Answer: $x = \frac{11}{5}$**

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## 7 Reverse percentages

Nina's rent goes up by 25%. (Calculator)
The new rent is £1000 a month.
Work out the rent before the increase.

The new rent is 100% + 25% = 125% of the old rent.
125% = £1000, so 1% = £1000 ÷ 125 = £8
100% = £8 × 100 = £800
**Answer: £800**

## 8 Radius from area or circumference

The circumference of a circle is 32 m. (Calculator)
Work out the diameter of the circle.
Give your answer correct to 1 decimal place.

Circumference = π × diameter
Diameter = 32 ÷ π = 10.186...
= 10.2 m (1 d.p.)
**Answer: 10.2 m**

## 9 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 50%. (Calculator)
Two weeks later it is reduced by a further 50% of the new price.
The final price is £100.
Work out the original price of the sofa.

Multipliers: 0.5 and 0.5
Overall multiplier = 0.5 × 0.5 = 0.25
Original price = £100 ÷ 0.25 = £400
**Answer: £400**

## 10 Currency conversion

£1 = 1.5 dollars
A holiday costs $375.
Work out the cost in pounds.

Divide by the rate: 375 ÷ 1.5
= £250
**Answer: £250**