



1

A pair of trainers costs £60.

In a sale the price is decreased by 20%.

Work out the sale price. You may use the multiplier 0.8

(2 marks)

20% off leaves 80%: multiplier 0.8

$$60 \times 0.8 = 48$$

£48

2

For each pair of triangles, write down the condition (SSS, SAS, ASA, RHS) that shows they are congruent, or write "not enough information".

- Both triangles have sides of 6 cm and 8 cm with an angle of  $50^\circ$  between them.
- Both triangles have a side of 7 cm with an angle of  $40^\circ$  at one end and an angle of  $60^\circ$  at the other end.
- Both triangles have a right angle, a hypotenuse of 13 cm and one other side of 5 cm.
- Both triangles have angles of  $50^\circ$ ,  $60^\circ$  and  $70^\circ$ .

(4 marks)

a)

two sides + angle between them

SAS

b)

two angles + side between them

ASA

c)

right angle, hypotenuse, one side

RHS

d)

angles only: size could be different

not enough information

- 3 Here are the first four terms of an arithmetic sequence.

3 10 17 24

Find an expression, in terms of  $n$ , for the  $n$ th term of the sequence.

(2 marks)

The common difference is 7, so the  $n$ th term contains  $7n$

The sequence  $7n$  gives 7, 14, 21, 28, which is 4 more than each term

The  $n$ th term is  $7n - 4$

Check

$$\text{when } n = 4, 7(4) - 4 = 24$$

$$7n - 4$$

- 4 Zak plays two games of darts. He draws a probability tree diagram.

On the first pair of branches he writes  $P(\text{win}) = 0.6$  and  $P(\text{lose}) = 0.5$ .

He then works out  $P(\text{win both games}) = 0.6 + 0.6 = 1.2$ .

Write down **two** mistakes Zak has made.

The games are independent, with the same probability of winning each game. There are no draws.

(2 marks)

The probabilities on any pair of branches must sum to 1, but  $0.6 + 0.5 = 1.1$

To combine two events along a path you multiply the probabilities, so  $P(\text{win both})$  should be  $0.6 \times 0.6 = 0.36$ , and 1.2 is impossible because a probability cannot be greater than 1

- 5 Two straight lines are parallel. A third line crosses them. Two angles lie between the parallel lines, on the same side of the crossing line, in a C shape. One of these angles is  $108^\circ$ .

Work out the size of the other angle. Give the name of this type of angle.

(2 marks)

C shape = co-interior angles

Co-interior angles add to  $180^\circ$

$$180 - 108 = 72$$

$$72^\circ, \text{ co-interior}$$

6

A hockey team played 25 matches. The table shows the number of goals the team scored in each match.

| Goals scored | Frequency |
|--------------|-----------|
| 0            | 4         |
| 1            | 7         |
| 2            | 9         |
| 3            | 3         |
| 4            | 2         |

- Write down the modal number of goals scored.
- Work out the total number of goals the team scored in the 25 matches.

(3 marks)

a)

Highest frequency is 9

mode = 2 goals

b)

goals  $\times$  frequency

$$0 \times 4 = 0$$

$$1 \times 7 = 7$$

$$2 \times 9 = 18$$

$$3 \times 3 = 9$$

$$4 \times 2 = 8$$

$$0 + 7 + 18 + 9 + 8 = 42$$

42 goals

7

- a. Write down the value of  $5^0$   
 b. Write down the value of  $2^{-3}$  as a fraction

(2 marks)

a)

anything<sup>0</sup> = 1

1

b)

Negative power: one over the positive power

$$2^{-3} = \frac{1}{2^3}$$

$$= \frac{1}{8}$$

 $\frac{1}{8}$ 

8

A taxi company charges a fixed fee plus a cost for each kilometre travelled. The table shows the cost, in pounds, for some journeys. The points lie on a straight line graph.

| Distance (km) | 0 | 2 | 4  | 6  |
|---------------|---|---|----|----|
| Cost (£)      | 3 | 7 | 11 | 15 |

- a. Work out the gradient of the line.  
 b. What does the gradient represent?  
 c. What does the y-intercept represent?

(3 marks)

a)

$$\text{Gradient} = \frac{\{\text{change in cost}\}}{\{\text{change in distance}\}}$$

$$= \frac{\{15 - 3\}}{\{6 - 0\}} = \frac{12}{6} = 2$$

b)

£2 per km

c)

y-intercept = 3: fixed fee of £3

a) 2 b) £2 per km c) £3 fixed fee

9

A = {factors of 12} B = {factors of 18}

- a. List the members of  $A \cap B$ .  
 b. Is 9 a member of  $A \cup B$ ? Give a reason for your answer.

(3 marks)

$$A = \{1, 2, 3, 4, 6, 12\} \text{ and } B = \{1, 2, 3, 6, 9, 18\}$$

The intersection is the numbers in both sets:  $\{1, 2, 3, 6\}$

The union contains every number in A or B (or both). 9 is a factor of 18, so 9 is in B and therefore in  $A \cup B$

10

- a. Complete the table of values for  $y = x^3 - 2x^2$

|   |    |   |   |   |   |
|---|----|---|---|---|---|
| x | -1 | 0 | 1 | 2 | 3 |
| y |    | 0 |   |   | 9 |

- b. Use the table to write down two values of x for which  $y = 0$

(4 marks)

a) When  $x = -1$ :  $y = -1 - 2 = -3$ ; when  $x = 1$ :  $y = 1 - 2 = -1$ ; when  $x = 2$ :  $y = 8 - 8 = 0$

b) The table shows  $y = 0$  at  $x = 0$  and at  $x = 2$

11

Leon walks to his friend's house. He leaves home at 10:00. The distance-time graph is a straight line which reaches 3 km at 10:45. He keeps walking at the same speed.

- a. Work out his speed in km/h.  
 b. His friend lives 7 km from Leon's home. At what time does Leon arrive?

(3 marks)

a)

$$45 \text{ min} = 0.75 \text{ h}$$

$$3 \div 0.75 = 4$$

$$4 \text{ km/h}$$

b)

$$7 \div 4 = 1.75 \text{ h}$$

$$1.75 \text{ h} = 1 \text{ h } 45 \text{ min}$$

$$10:00 + 1 \text{ h } 45 \text{ min} = 11:45$$

12

a. Write 0.0698 in standard form.

b. Which is greater,  $7.3 \times 10^{-2}$  or 0.0698?

You must show your working.

(3 marks)

$$a) 0.0698 = 6.98 / 100 = 6.98 \times 10^{-2}$$

b)  $7.3 \times 10^{-2} = 0.073$ . Comparing 0.073 with 0.0698: 0.073 is larger

b) So  $7.3 \times 10^{-2}$  is greater

13

Write 84 as a product of its prime factors.

(2 marks)

$$84 = 2 \times 42$$

$$42 = 2 \times 21 \text{ and } 21 = 3 \times 7$$

$$\text{So } 84 = 2 \times 2 \times 3 \times 7 = 2^2 \times 3 \times 7$$

$$\boxed{2^2 \times 3 \times 7}$$

14

Solve  $\frac{x+4}{3} = \frac{2x-1}{5}$ 

(3 marks)

$$\begin{array}{rcl} \frac{x+4}{3} & = & \frac{2x-1}{5} \\ \times 15 & & \times 15 \\ 5(x+4) & = & 3(2x-1) \\ 5x+20 & = & 6x-3 \\ -5x & & -5x \\ 20 & = & x-3 \\ +3 & & +3 \\ 23 & = & x \end{array}$$

$$\boxed{x = 23}$$

15

Solve  $4x + 3 = x + 18$ 

(2 marks)

$$\begin{array}{rcl} 4x+3 & = & x+18 \\ -x & & -x \\ 3x+3 & = & 18 \\ -3 & & -3 \\ 3x & = & 15 \\ \div 3 & & \div 3 \\ x & = & 5 \end{array}$$

$$\boxed{x = 5}$$

16 Solve  $4x + 3 < 19$

(2 marks)

Subtract 3 from both sides:  $4x < 16$

Divide both sides by 4:  $x < 4$

$$x < 4$$

17 A locker code is made up of one letter followed by two digits.

The letter is chosen from the 26 letters A to Z.

Each digit is chosen from 0 to 9, and digits may repeat.

Work out the number of different codes that are possible.

(2 marks)

There are 26 choices for the letter, 10 for the first digit and 10 for the second digit

$$26 \times 10 \times 10 = 2600 \text{ different codes}$$

$$2600$$

18 Hannah puts £2400 into a savings account.

The account pays 3% simple interest each year.

Work out the total amount of interest Hannah gets after 3 years.

(2 marks)

Interest for one year

$$3\% \text{ of } 2400 = 0.03 \times 2400 = 72 \text{ pounds}$$

Simple interest is the same each year, so over 3 years it is  $3 \times 72 = 216$  pounds

$$£216$$

19 Each exterior angle of a regular polygon is  $30^\circ$ .

Work out the number of sides of the polygon.

(2 marks)

The exterior angles of any polygon add up to  $360^\circ$

$$\text{Number of sides} = 360 \div 30 = 12$$

Walking once around a convex polygon turns you through one complete turn,  $360^\circ$ . In a regular polygon each turn is equal, so divide  $360^\circ$  by the exterior angle

$$12$$

20

The mass of a parcel is 340 g, correct to the nearest 10 g.

Complete the error interval for the mass,  $m$  grams, of the parcel.

.....  $\leq m <$  .....

(2 marks)

Rounding to the nearest 10 g means the true mass is within 5 g of 340 g

Lower bound

$$340 - 5 = 335. \text{ Upper bound: } 340 + 5 = 345$$

$$\text{So } 335 \leq m < 345$$

Include the lower boundary because a value exactly halfway rounds up to the stated result. Exclude the upper boundary because that halfway value rounds up to the next result instead

$$335 \leq m < 345$$