1 The probability of picking a red sweet from a bag is 0.05 .

Find the probability of not picking a red sweet.

$1 - 0.05$

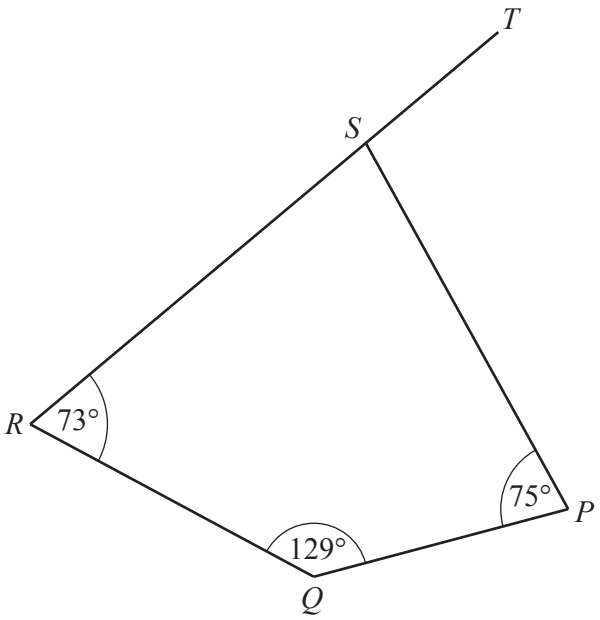
..... 0.95 ..... [1]

2 Work out the value of $\frac{m\,k^3}{\sqrt{3}}$ when $m = 4$ and $k = 7$.

$\frac{4 \times 7^3}{\sqrt{3}} \approx 792$

..... 792 ..... [2]

3



NOT TO SCALE

PQRS is a quadrilateral.
RST is a straight line.

Find angle *PST*.

$\widehat{RSP} = 360° - 73° - 129° - 75° = 83°$

$\widehat{PST} = 180° - 83° = 97°$

Angle *PST* = ... 97° ..... [2]

4 These are the masses, in kg, of 12 parcels.

0.3 0.4 1.2 0.8 1.1 2.1 1.7 1.8 1.2 2.3 0.7 1.1

(a) Complete the stem-and-leaf diagram for the 12 parcels.

0	3	4	7	8		
1	1	1	2	2	7	8
2	1	3				

Key: 0 | 3 represents 0.3 kg

[2]

(b) Find the median.

$\frac{1.1 + 1.2}{2}$

1.15 kg [1]

5 The nth term of a sequence is $n^2 - 1$.

Find the first three terms of this sequence.

0 , 3 , 8 [2]

6 Simplify.

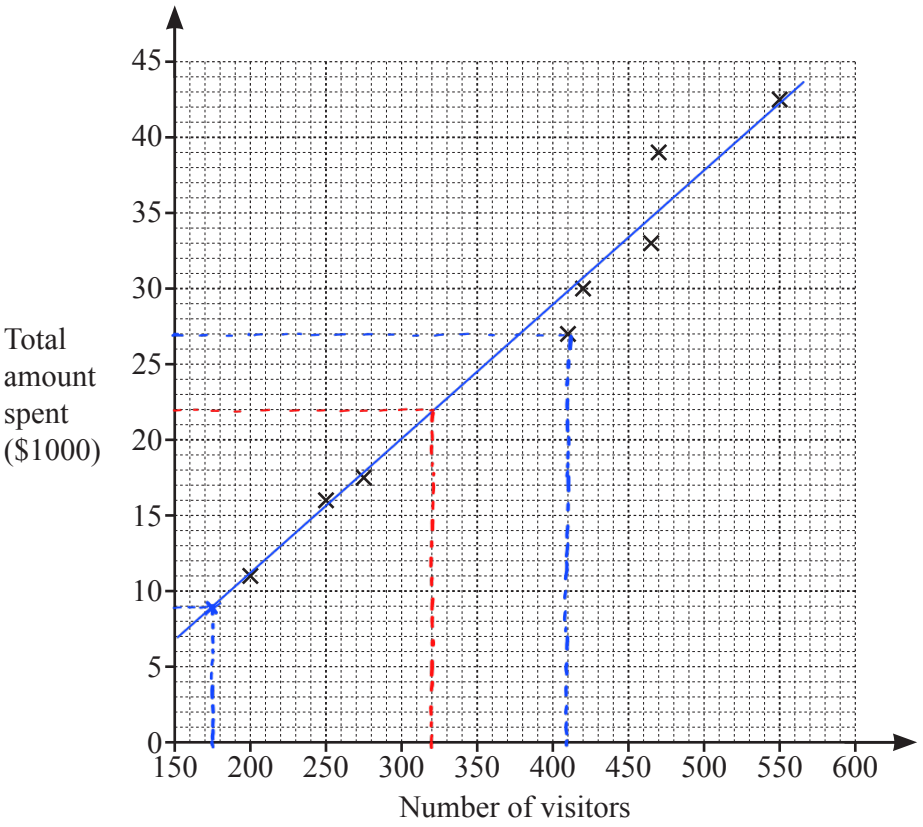
(a) $y^3 \div y^5$

y^{-2} [1]

(b) $7x^0 = 7 \times 1 = 7$

7 [1]

7 The scatter diagram shows the number of visitors and the total amount spent, in thousands of dollars, at a zoo on each of eight days.



(a) On one of the eight days there are 410 visitors.

Find the total amount spent by visitors during this day.

$ ....27.000..... [1]

(b) Information for the ninth day is shown in the table.

Number of visitors	175
Total amount spent ($1000)	9

Plot this information on the scatter diagram. [1]

(c) Draw a line of best fit on the scatter diagram. [1]

(d) On the tenth day the total amount spent is $22 000.

Estimate the number of visitors on this day.

.....320..... [1]

8 **Without using a calculator**, work out $\frac{2}{9} \div \frac{5}{6}$.

You must show all your working and give your answer as a fraction in its simplest form.

$\frac{2}{9} \times \frac{6}{5}$

$= \frac{12}{45} = \frac{4}{15}$

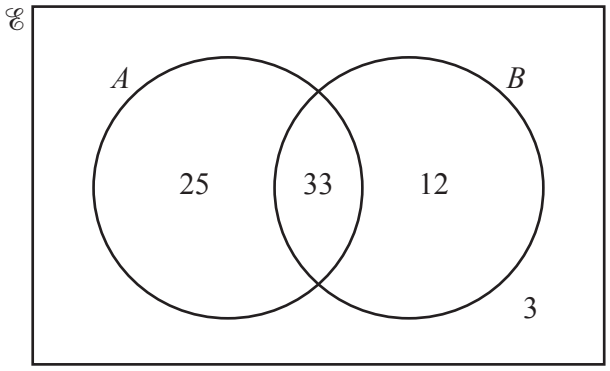
..... $\frac{4}{15}$ ..... [2]

9 Change 300 m / min to km / h.

$\frac{300 \text{ m}}{1 \text{ min}} = \frac{\frac{300}{1000} \text{ km}}{\frac{1}{60} \text{ h}} = 18$

..... 18 ..... km / h [2]

10

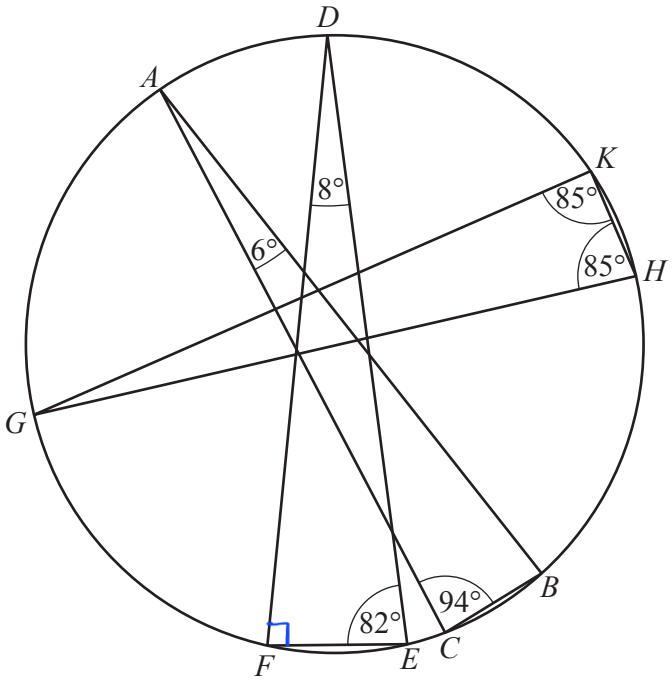


Find $n(A \cap B)'$.

$25 + 12 + 3$

..... 40 ..... [1]

11 *ABC*, *DEF* and *GHK* are triangles with all vertices on the circumference of a circle.



NOT TO SCALE

From the list, draw a ring around the line that is a diameter of the circle.

AB *AC* *DE* *DF* *GH* *GK*

[1]

12 *f* is a common factor of 14 and 28.
m is a common multiple of 10 and 25.
p is a prime number.

Work out the largest possible value of $\frac{f}{mp}$.

$\frac{f}{mp}$ max when f max, m min and p min

$\Rightarrow f = HCF(14, 28) = 14$

$m = LCM(10, 25) = 50$

$p = 2$

$\Rightarrow \frac{14}{50 \times 2}$

..... 0.14 ..... [4]

13 Factorise completely.

(a) $18px - 27p$

$9p(2x-3)$ [2]

(b) $mt - n - m + nt$

$(mt - m) + (nt - n)$

$m(t-1) + n(t-1)$

$(m+n)(t-1)$

$(m+n)(t-1)$ [2]

14 Find the nth term of this sequence.

8, 17, 32, 53, 80, …

+9 +15 +21 +27

+6 +6 +6

$3n^2 + 5$ [2]

15 Solve.

$12x - 3 \geqslant 4x + 13$

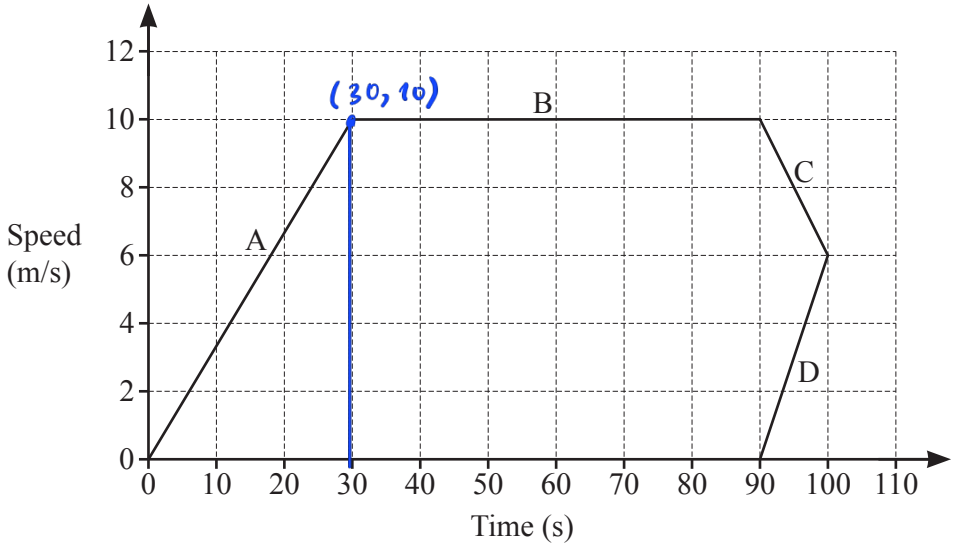
$12x - 4x \geqslant 13 + 3$

$8x \geqslant 16$

$x \geqslant \frac{16}{8}$

$x \geqslant 2$ [2]

16 Abdul draws this speed–time graph for a journey.
The graph has four sections A, B, C and D.



Complete these statements about the speed–time graph.

Section .....D..... cannot be correct.

Section .....B..... shows constant speed.

Section .....C..... shows deceleration.

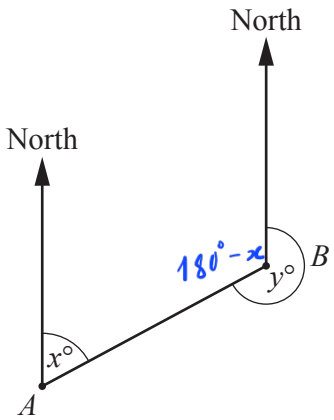
Section A shows acceleration of .....$\frac{1}{3}$..... m/s^2.

$\frac{10-0}{30-0}$

The distance travelled in the first 30 seconds of the journey is .....150..... m. [4]

$\frac{1}{2} \times 30 \times 10$

18 The bearing of B from A is $x°$.
The bearing of A from B is $y°$.
$x : y = 2 : 7$
Calculate the value of y.



NOT TO SCALE

$\frac{x}{y} = \frac{2}{7}$

$\Rightarrow 7x = 2y \quad (1)$

$180 - x + y = 360°$

$\Rightarrow -x + y = 180°$

$\Rightarrow y = 180° + x \quad (2)$

Sub (2) into (1): $7x = 2(180° + x)$

$7x = 360° + 2x$

$5x = 360°$

$x = 72°$

$y = 180° + 72° = 252°$

$y =$ 252° [3]

19 $f(x) = kx^2$ $g(x) = \frac{1}{x}$ $h(x) = \frac{7x-2}{5}$ $j(x) = \frac{3-10x}{14}$

(a) $f(-5k) = 675$

Find the value of k.

$k(-5k)^2 = 675$

$k \times 25k^2 = 675$

$k^3 = 27$

$k = 3$

$k =$ ..... 3 ..... [2]

(b) Find $gh(x)$.

$\frac{1}{\frac{7x-2}{5}} = \frac{5}{7x-2}$

..... $\frac{5}{7x-2}$ ..... [1]

(c) Find $h^{-1}(x) + j(x)$.
Give your answer in its simplest form.

h: $\times 7 \rightarrow -2 \rightarrow :5$

$:7 \leftarrow +2 \leftarrow \times 5 : h^{-1}(x)$

$h^{-1}(x) = \frac{5x+2}{7}$

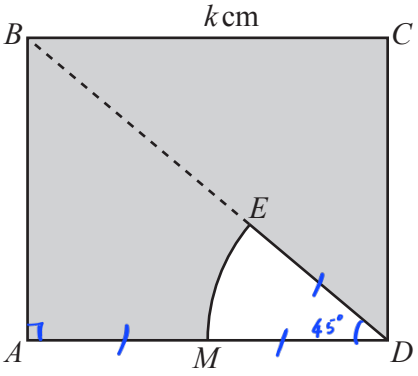
$h^{-1}(x) + j(x) = \frac{5x+2}{7} + \frac{3-10x}{14}$

$= \frac{2(5x+2) + 3 - 10x}{14}$

$= \frac{7}{14} = \frac{1}{2}$

..... $\frac{1}{2}$ ..... [4]

20



NOT TO SCALE

The diagram shows a square $ABCD$ with side length k cm.
MDE is a sector of a circle, centre D.
E lies on the diagonal, BD, of the square.
M is the midpoint of AD.

Find the percentage of the square that is shaded.

$\tan \hat{ADB} = \frac{AB}{AD} = 1$

$\Rightarrow \hat{ADB} = 45° = \frac{45\pi}{180}$ radian

$\Rightarrow$ Area Sector DEM $= \frac{1}{2} \times MD^2 \times \frac{45\pi}{180}$

$= \frac{1}{2}\left(\frac{k}{2}\right)^2 \times \frac{45\pi}{180} = \frac{k^2\pi}{32}$

$\Rightarrow$ Area shaded $= k^2 - \frac{k^2\pi}{32}$

$\Rightarrow$ percentage $= \frac{k^2 - \frac{k^2\pi}{32}}{k^2} \times 100 = \frac{k^2\left(1 - \frac{\pi}{32}\right)}{k^2} \times 100 \approx 90.2\%$

.....90.2..... % [4]

21 Neha has a piece of ribbon of length 23 cm, correct to the nearest cm. 1
From this ribbon she cuts off a piece with length 87 mm, correct to the nearest mm. 0.1 cm
8.7 cm
Work out the lower bound and the upper bound for the length of the remaining ribbon.
Give your answer in centimetres.

Length of remaining ribbon = $23 - 8.7$

Lower bound = $\left(23 - \frac{1}{2}\right) - \left(8.7 + \frac{0.1}{2}\right) = 13.75$

upper bound = $\left(23 + \frac{1}{2}\right) - \left(8.7 - \frac{0.1}{2}\right) = 14.85$

Lower bound = ... 13.75 ..... cm

Upper bound = ... 14.85 .....cm [3]

22 Simplify.

$$\frac{5x - x^2}{25 - x^2}$$

$\frac{x(5-x)}{5^2 - x^2} = \frac{x(5-x)}{(5-x)(5+x)} = \frac{x}{5+x}$

..... $\frac{x}{5+x}$ ..... [3]

23 Solve the equation $3\sin x + 3 = 1$ for $0° \leqslant x \leqslant 360°$.

$3\sin x = -2$

$\sin x = \frac{-2}{3}$

$x = -41.8°$ or $x = 180° - (-41.8°) = 221.8°$

or $x = -41.8° + 360° = 318.2°$

x = ... 221.8° ..... or x = ... 318.2° ..... [3]

24 y is inversely proportional to the cube of $(x-1)$.
$y = 9.45$ when $x = 3$.

Find y when $x = 4$.

$$y = \frac{k}{(x-1)^3}$$

$$9.45 = \frac{k}{(3-1)^3} = \frac{k}{8}$$

$$\Rightarrow k = 75.6$$

$$y = \frac{75.6}{(x-1)^3}$$

When $x = 4$, $y = \frac{75.6}{(4-1)^3} = 2.8$

$y =$ ...2.8... [3]

25 $m^{-\frac{1}{4}} = 27m^{-1}$

Find the value of m.

$$m^{-\frac{1}{4}} \div m^{-1} = 27$$

$$m^{\frac{3}{4}} = 27$$

$$\left(\sqrt[4]{m}\right)^3 = 3^3$$

$$\sqrt[4]{m} = 3$$

$$\Rightarrow m = 3^4$$

$m =$ ...81... [3]