10 A mathematics teacher at a school asked a group of students how far, in kilometres, each student had travelled to get to school that day.

The table gives information about their answers.

Distance travelled (d km)	Number of students
$0 < d \leqslant 2$	x
$2 < d \leqslant 4$	11
$4 < d \leqslant 6$	8
$6 < d \leqslant 8$	6
$8 < d \leqslant 10$	5

The teacher calculated that an estimate for the mean distance travelled by the whole group of students was 4.25 km.

Work out the value of x.
Show your working clearly.

$x =$ .....

(Total for Question 10 is 4 marks)

11 A circle centre O has radius 9 cm.

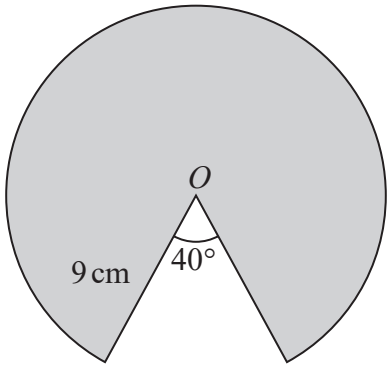


Diagram **NOT** accurately drawn

Calculate the perimeter of the shaded sector of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 11 is 4 marks)

12 Solve the simultaneous equations $2x + 7y = 17$
$5x + 3y = -1$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 12 is 4 marks)

13 The diagram shows two hot air balloons.
A is a point on the base of one of the balloons and B is a point on the base of the other balloon.

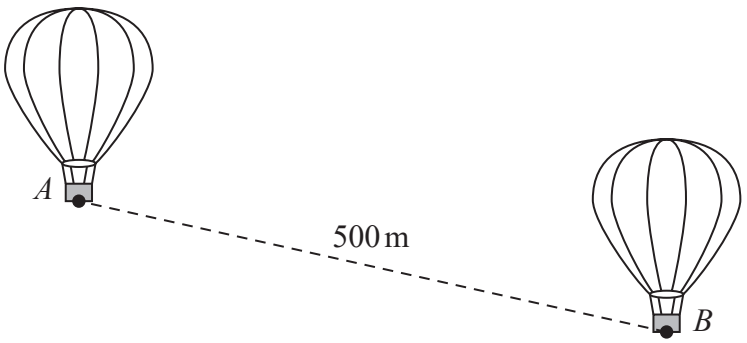


Diagram **NOT** accurately drawn

The distance between A and B is 500 metres.
The angle of depression of B from A is 23°

Calculate the vertical height of A above B.
Give your answer correct to one decimal place.

..... metres

(Total for Question 13 is 3 marks)

14 Simon bought a house at the beginning of 2018
The value of Simon's house had decreased by 15% by the end of 2018

The house increased in value during both 2019 and 2020
The percentage increases in the value of the house during 2019 and 2020 were the same.

The value of Simon's house at the end of 2020 was 2.85% greater than the amount he paid for his house at the beginning of 2018

Calculate the percentage increase in the value of the house during 2019

.....%

(Total for Question 14 is 4 marks)

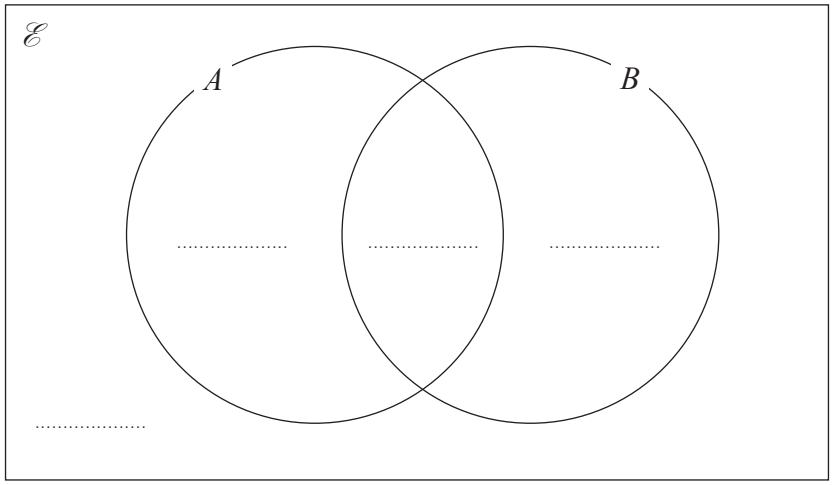
15 Prove algebraically that the product of any two odd numbers is always an odd number.

(Total for Question 15 is 4 marks)

16 Two events A and B are such that $n(A) = 62$ $n(B) = 30$ and $n(A \cup B) = 68$

Given that $n(\mathscr{E}) = 80$

(a) complete the Venn diagram to show the number of elements in each region.



(2)

An element is chosen at random from $\mathscr{E}$.

(b) Using the Venn diagram, find the probability that this element is in

(i) $A \cap B$

.....

(1)

(ii) $A \cup B'$

.....

(2)

(Total for Question 16 is 5 marks)

17 The functions f and g are defined as

$f(x) = x^2 + 6$
$g(x) = x - 10$

(a) Find fg(3)

.....

(2)

(b) Solve the equation $fg(x) = f(x)$
Show clear algebraic working.

.....

(3)

The function h is defined as

$$h(x) = \frac{2x - 4}{x}$$

(c) State the value of x that cannot be included in the domain of h

.....

(1)

(d) Express the inverse function h^{-1} in the form $h^{-1}(x) = \ldots$

$h^{-1}(x) =$ .....

(3)

(Total for Question 17 is 9 marks)