KS3 Practice Paper

Mathematics

Higher

Calculator

1 hour (60 marks)

Name: _____

Class: _____

1. We can use this formula to find the energy of a moving object:

   $E = \frac{1}{2} \times m \times v^2$

   Where m is the mass of the object in kg and v is its velocity in m/s.

   Find the energy in joules of an object with a mass of 15kg travelling at 32m/s. (2 marks)

   _____ Joules

2. Factorise fully:

   a. $5a^2 - 40a$ (2 marks)

   b. Expand: $4x(x - 3)$ (2 marks)

3. a. Circle all the prime numbers: (1 mark)

   5 9 2 13 25 1

   b. Martha states that when two square numbers are added, the answer will always be a square number. For example: 9 + 16 = 25

   Give an example to show that this is not always true. (1 mark)

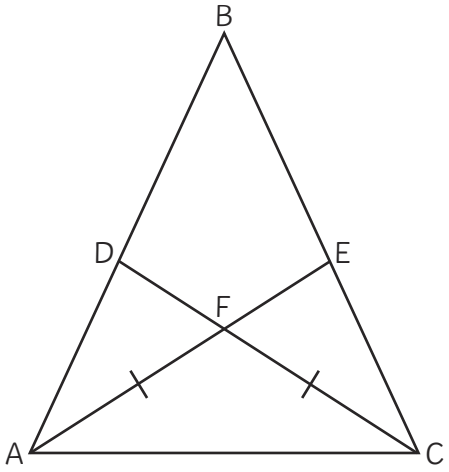
4. a. Increase 380 by 12%. (2 marks)

b. To calculate VAT, 20% is added to the price of goods. This gives the price including VAT that shops will charge their customers for the goods.

A customer buys an item for a total cost of £24 including VAT.
Calculate the amount of VAT on the item. (3 marks)

5. Triangle ABC is isosceles with AB = BC and AE = DC.

Prove that triangles ADC and AEC are congruent. (3 marks)



6. A gardener needs to add new grass seed to their lawn. Their lawn is in the shape of a rectangle with a quarter circle on the end.

Each packet of seed will cover $15m^2$.

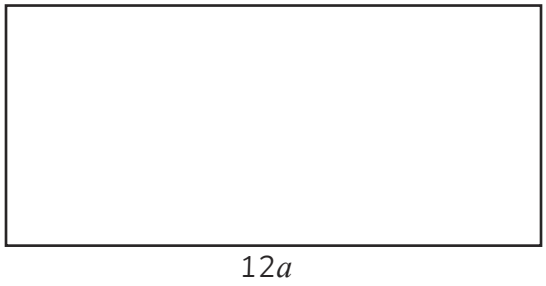
How many packets are needed to sow the lawn? You must show all of your working. (5 marks)

7. The table below summarises the results of a survey which asked people about their shoe size.

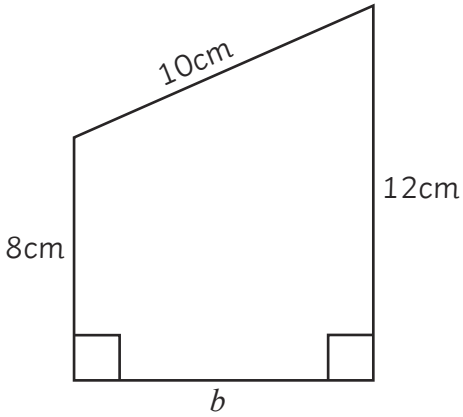
Size	Frequency
4	8
5	10
6	11
7	13
8	18
9	12
10	5
11	2

Find the mean average of the shoe sizes. Give your answer correct to 1 decimal place. (3 marks)

8. a. The length of the diagonal in the rectangle is 39cm. Calculate the value of a. (3 marks)



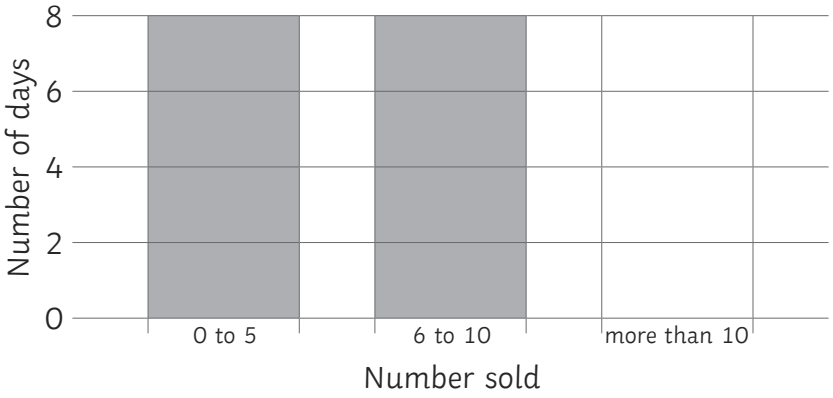
b. Calculate the length of side b. Give your answer correct to 2 decimal places. (3 marks)



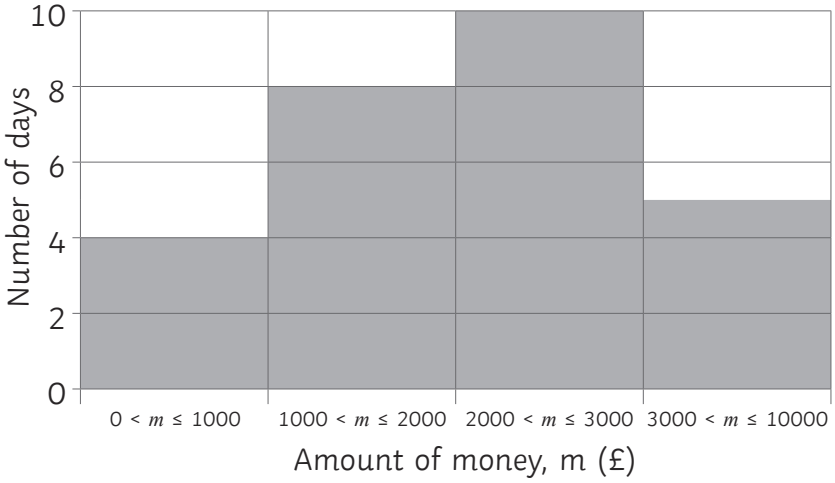
b = _____ cm

9. A shop has stocked a new product. To find out if the new product has been successful, the manager keeps a record of how many they sell each day for 20 days.

   a. Complete the bar chart to show on how many days the shop sold more than 10 of the new product. (1 mark)



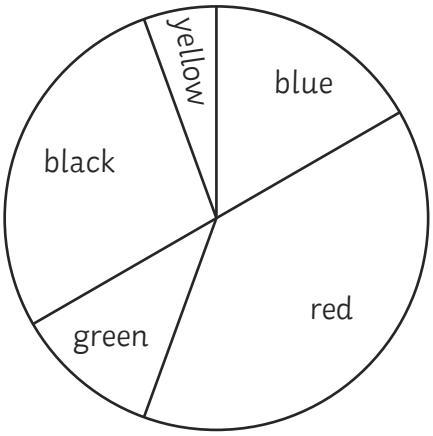
The manager also kept records of how much money they made from sales each day.



   b. How many days did the manager record the sales for? (1 mark)

   c. What might be misleading about the bar chart? (1 mark)

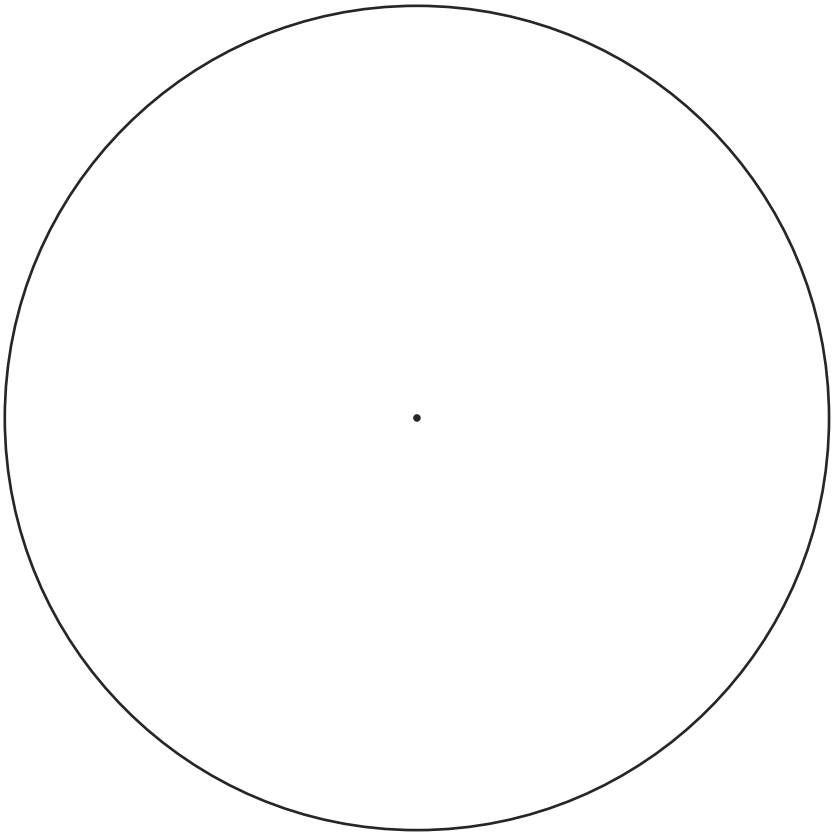
10. The diagram below summarises the results of a survey which asked 36 people to name their favourite colour.



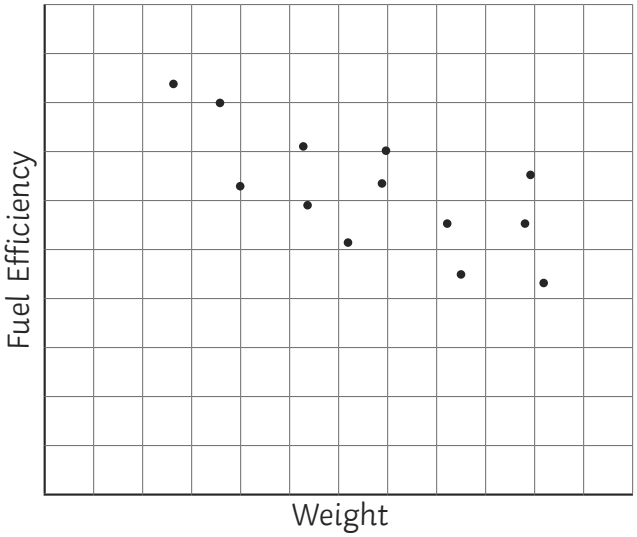
a. Calculate how many people chose red as their favourite colour. (2 marks)

b. The table below shows the results of a survey which asked 60 people to name their favourite sport. Draw a pie chart to represent the data. (3 marks)

Favourite sport	No.
Football	24
Cricket	9
Basketball	10
Netball	12
Other	5



11. A car company studies how the weights of their cars affect fuel efficiency.
The diagram shows their results.



a. Draw a line of best fit on the diagram. (1 mark)

b. Describe the relationship between the weights of the cars and their efficiency. (1 mark)

12. A Input → +3 → ×2 → ×5 → Output

B Input → ×2 → +5 → ×6 → Output

C Input → ×2 → +6 → ×5 → Output

D Input → ×5 → +10 → ×2 → Output

Given the same input, which two function machines will always give the same outputs as each other?

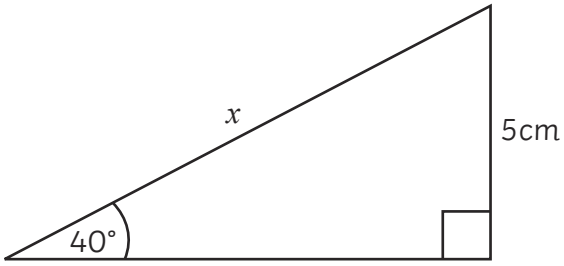
You must show clear, algebraic working. (2 marks)

13. When a ball falls, its kinetic energy is directly proportional to the square of its speed.

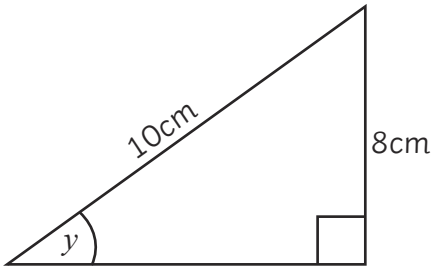
When its speed is 12m/s, its kinetic energy is 9000 joules.

Find its kinetic energy when its speed is 20m/s. (3 marks)

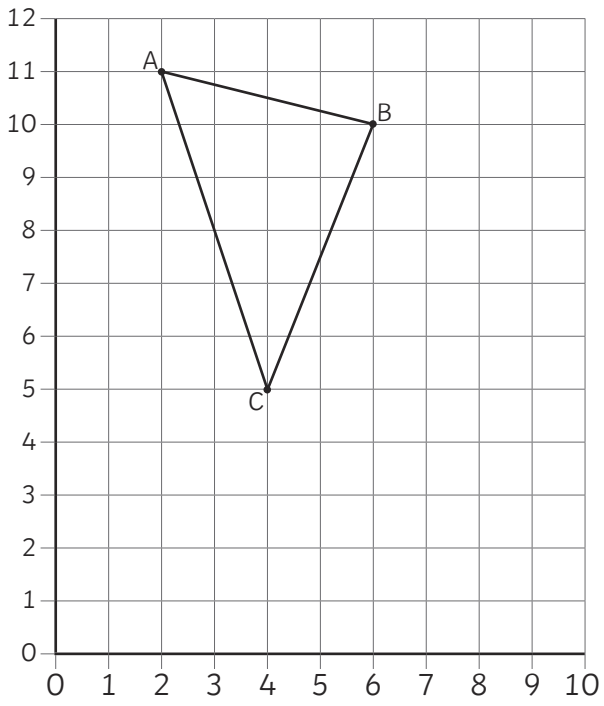
14. a. Calculate the value of x. Give your answer correct to 1 decimal place. (3 marks)



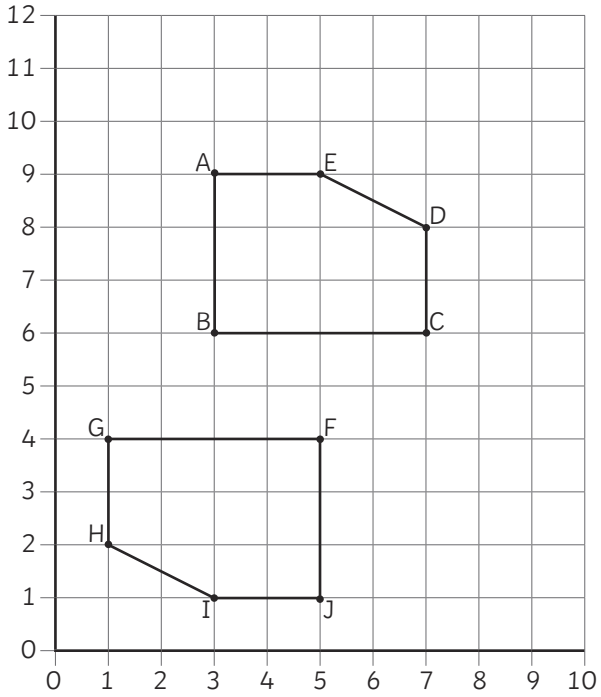
b. Calculate the value of y. Give your answer correct to 1 decimal place. (3 marks)



15. a. Enlarge triangle ABC using scale factor $\frac{1}{2}$ and centre of enlargement (2, 3). (3 marks)



b. Describe the single transformation which transforms shape ABCDE to FGHIJ. (3 marks)



16. Evaluate:

a. $(\frac{3}{4})^2$ (1 mark)

b. $(3a^2)^4$ (2 marks)