Level 3 Essential Application of Number Skills

Maximum duration: 60 minutes

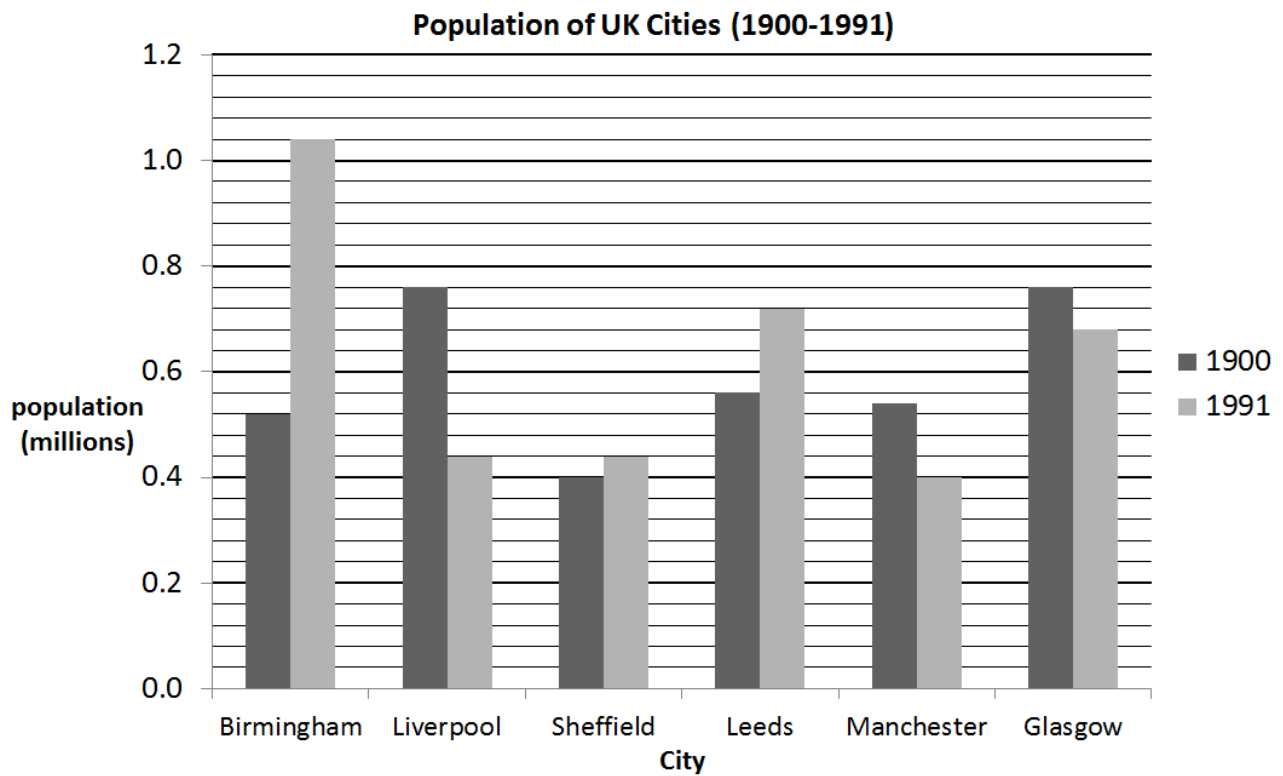**This test consists of 30 multiple choice questions.**

Sample Assessment – Paper 2

The use of a calculator is not allowed

Questions 1 to 4 are about the population of cities.

1   This graph shows the change in population of some cities in the UK.

Population of UK Cities (1900-1991)

What was the difference between the populations of Birmingham and Liverpool in 1900?

A	0.21 million	
B	0.22 million	
C	0.24 million	
D	0.26 million	

2   This graph shows the change in population of some cities in the UK.

Population of UK Cities (1900-1991)
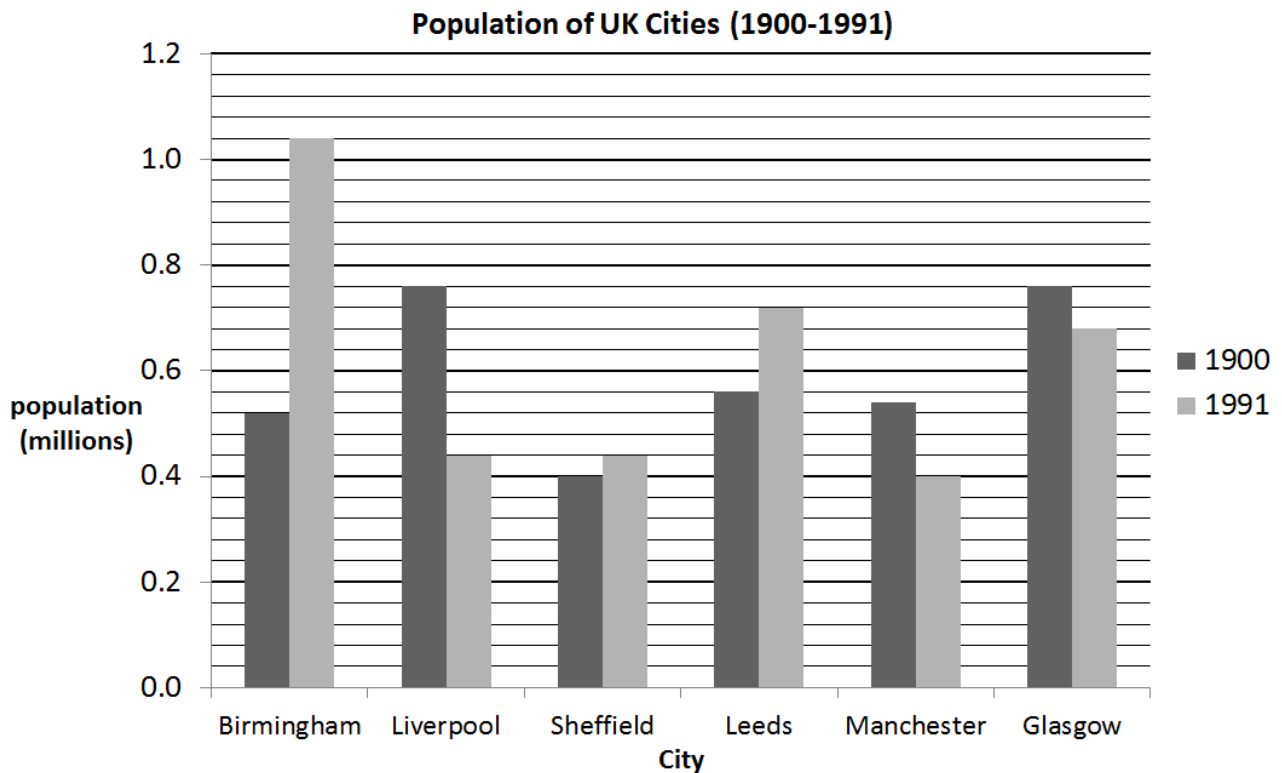
Which of these statements is correct?

A	In 1991 the population of Birmingham was three times greater than the population of Manchester	
B	Between 1900 and 1991 the population of Sheffield changed by less than 20 000	
C	The population of Glasgow was 50% greater than the population of Liverpool in 1991	
D	The increase in the population of Leeds is four times greater than the increase in the population of Sheffield between 1990 and 1991	

3   In 1901 Swansea had a population of 9.45×10^4

In 2015 its population was 2.42×10^5

By how much did the population of Swansea grow between 1901 and 2015?

A	147 500	
B	70 300	
C	14 750	
D	7 030	

4   The population of Wales is 3.1 million.

The expected growth in population is 0.3% per year.

Which calculation gives the expected population after 3 years?

A	3.1×1.003^3	
B	$3.1 \times 1.003 \times 3$	
C	3.1×1.03^3	
D	$3.1 \times 1.03 \times 3$	

Questions 5 to 7 are about a farmer's field.

5   A farmer has a field with an area of 4 hectares.

She sells it for £8000 per acre.

1 hectare = 2.47 acres

What is the total selling price for the field?

A	£4 940	
B	£12 955	
C	£51 760	
D	£79 040	

6   This equation is used to calculate the maximum number of cows that should graze in a field.

$$a = 0.4c - 0.01c^2$$

Where   **c** is the number of grazing cows
         a is the area of the field in hectares.

What is the minimum area of a field that can accommodate 6 grazing cows?

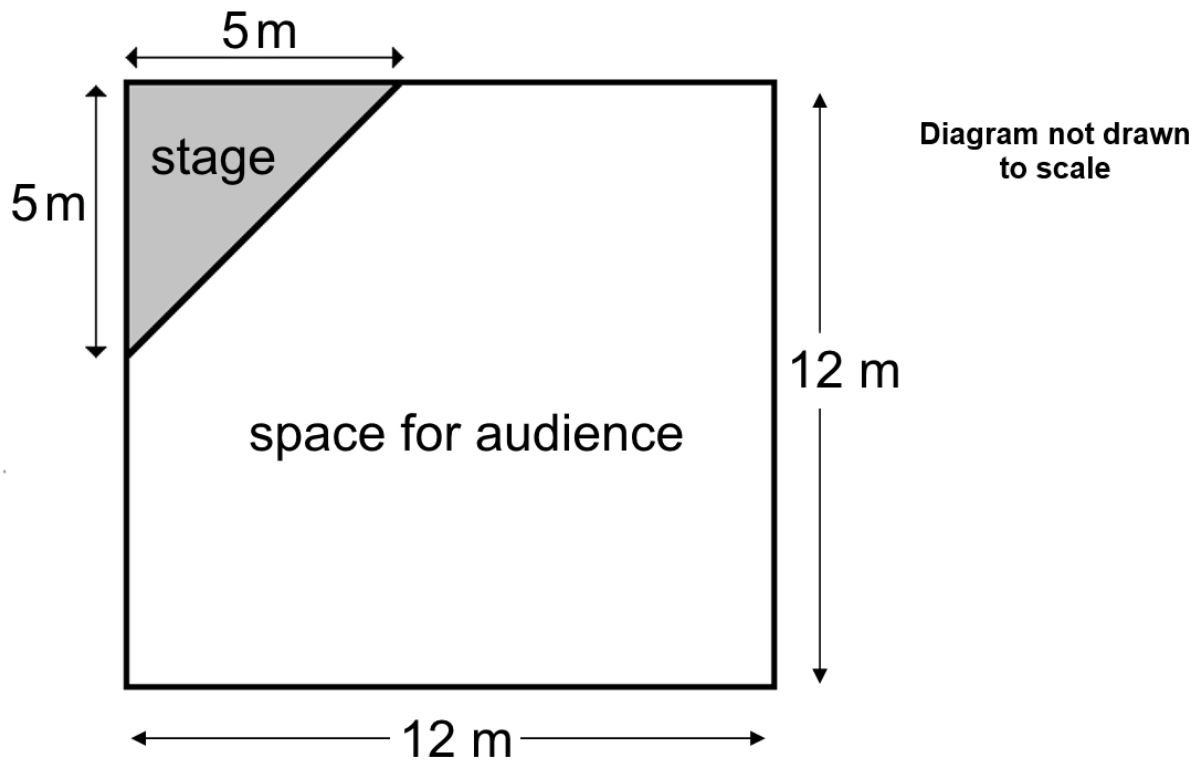| A	2.04 hectares	
B	2.28 hectares	
C	2.364 hectares	
D	2.76 hectares	

7   A field can support a maximum of either 15 grazing cows or 25 horses.

What is the maximum number of horses that can be kept in a field that can support 25 grazing cows?

A	35	
B	40	
C	41	
D	42	

Questions 8 to 10 are about a concert.

8   This is a plan of a concert hall. It has a triangular stage.

Diagram not drawn to scale

What is the area of space for the audience?

A	119 m²	
B	121.5 m²	
C	131.5 m²	
D	139 m²	

9   At a different venue, the space for the audience is 240 m².

There should be a maximum of 1.5 people per square metre.

The cost of organising a concert is £1150

Tickets are £9 each.

The maximum number of people buy tickets.

How much money is left over after the cost of organising the concert is paid?

A	£2190	
B	£2090	
C	£310	
D	£290	

10   The organisers of a concert measure the rate at which people can leave the building.

At one event, 150 people leave in 240 seconds.

What is the average exit rate per minute at this event?

A	37.5 people per minute	
B	62.5 people per minute	
C	90 people per minute	
D	96 people per minute	

Questions 11 to 13 are about a test.

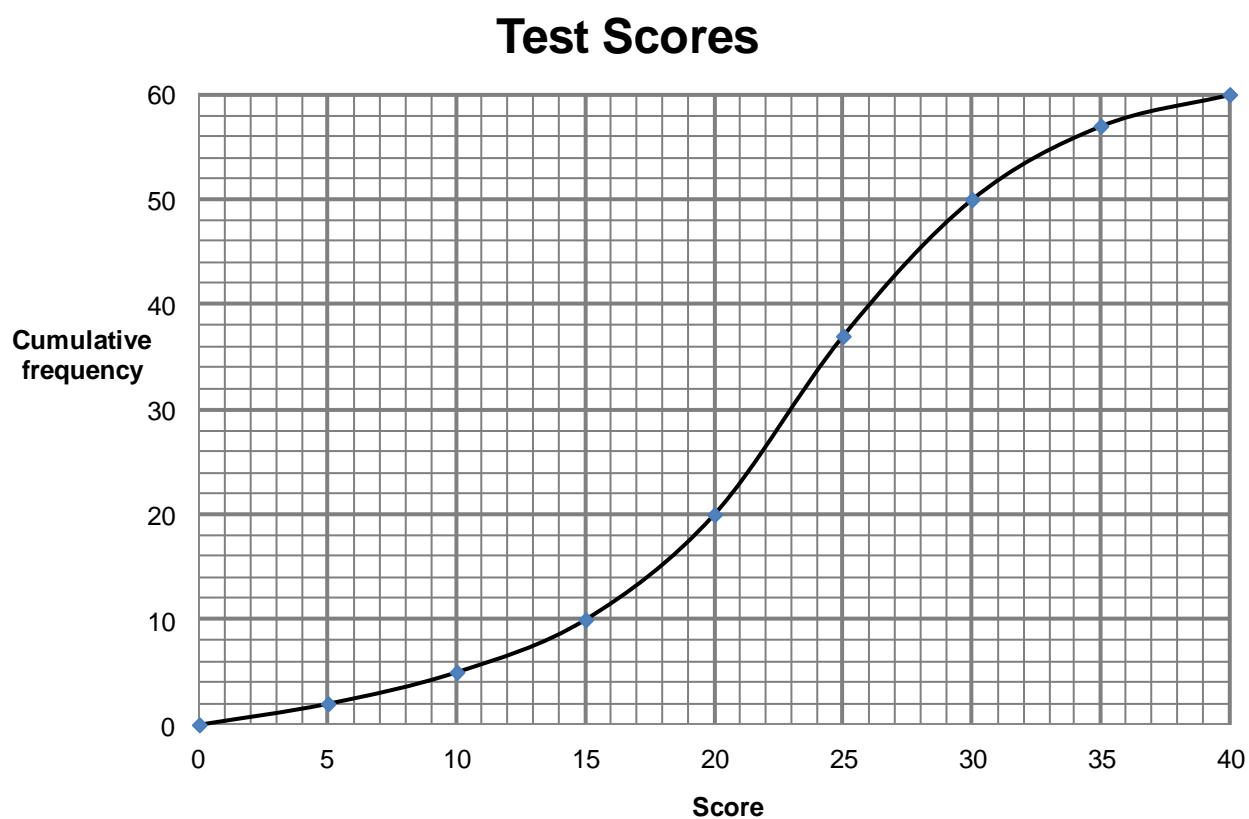11   This graph shows the score obtained in a test by 60 students. The test had a top mark of 40

Test Scores
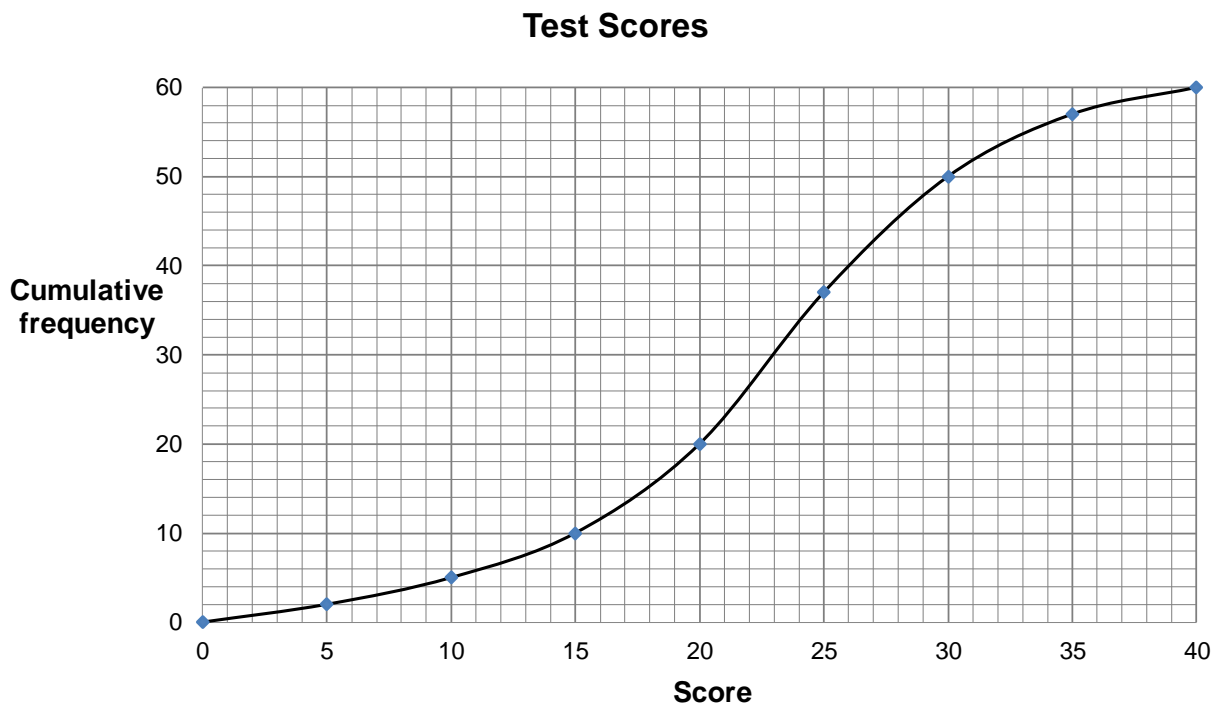
Which is closest to the median score?
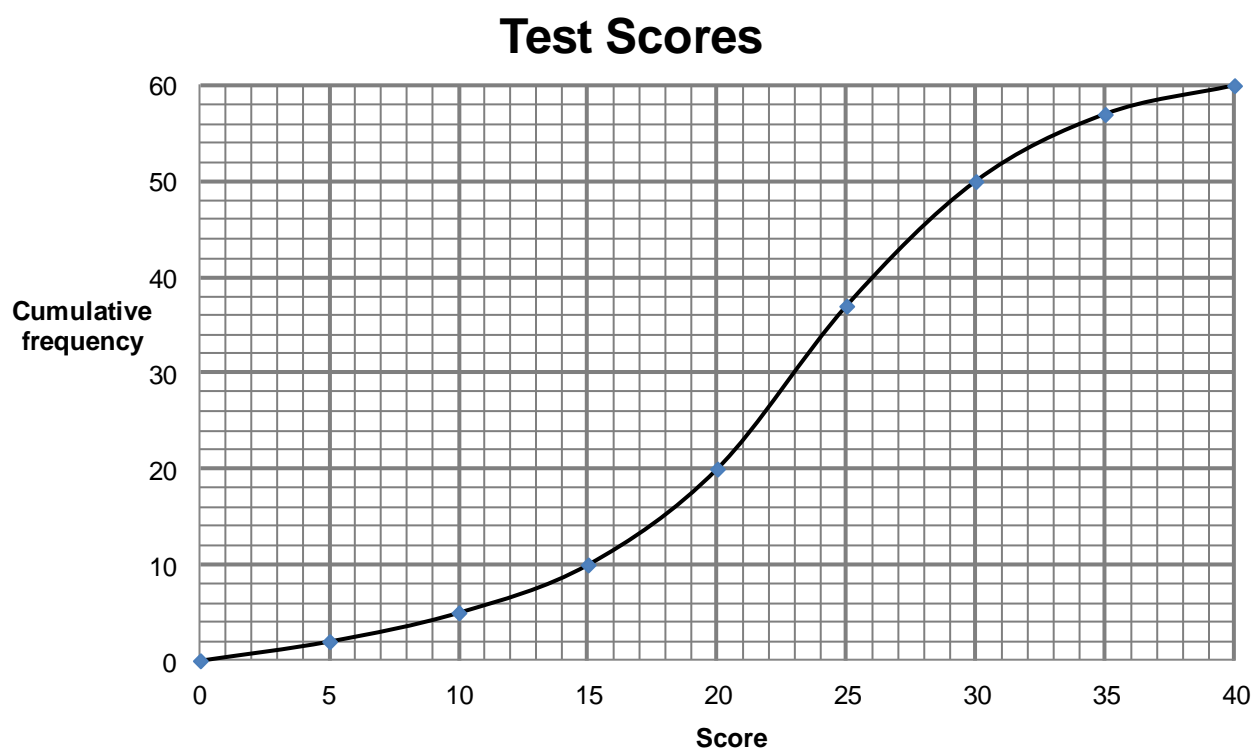
A	20	
B	21	
C	23	
D	24	

12   This graph shows the score obtained in a test by 60 students. The test had a top mark of 40.

Test Scores

Cumulative frequency

Score

Which one of the following is closest to the interquartile range of the scores?

A	6	
B	10	
C	20	
D	30	

13 This graph shows the score obtained in a test by 60 students. The test had a top mark of 40.

Test Scores
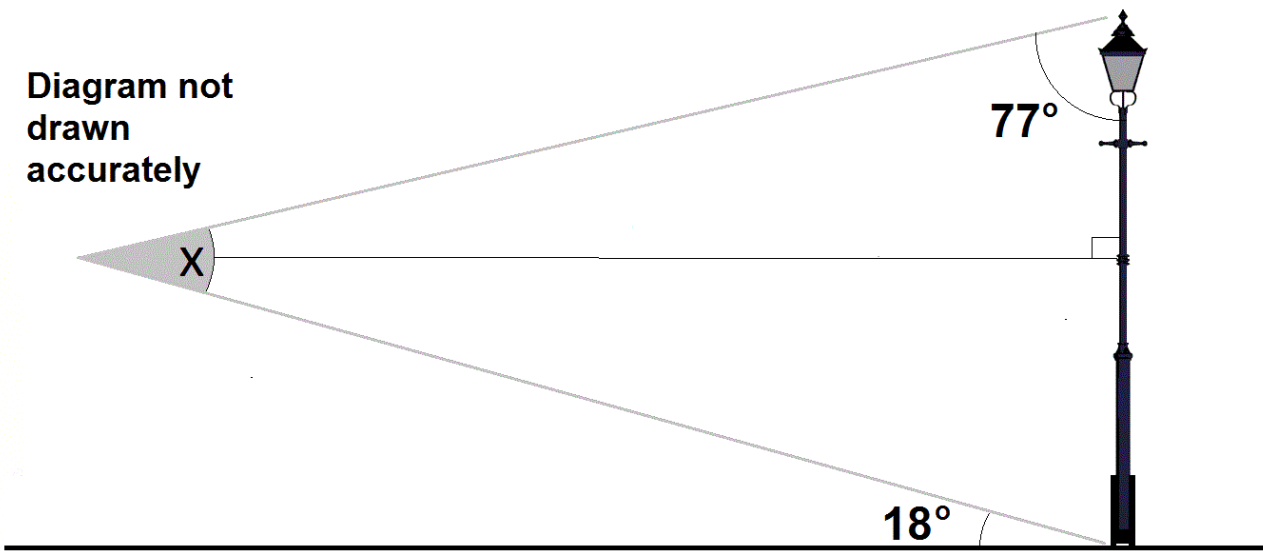

Students that scored over 25 marks passed the test.

What percentage of students passed the test, to the nearest percent?

A	25%	
B	38%	
C	58%	
D	62%	

Questions 14 to 15 are about a street lamp.

14   A lamp post is viewed from a distance and some angles are measured. This diagram shows the angles.

Diagram not drawn accurately

77°

X

18°

What is the size of angle X?

A	59 degrees	
B	41 degrees	
C	31 degrees	
D	21 degrees	

15   Another street lamp is fixed to a building.
      The foot of a ladder is placed 0.75 m from the base of the building.

      The ladder is 3 m long

**Diagram not
drawn to scale**
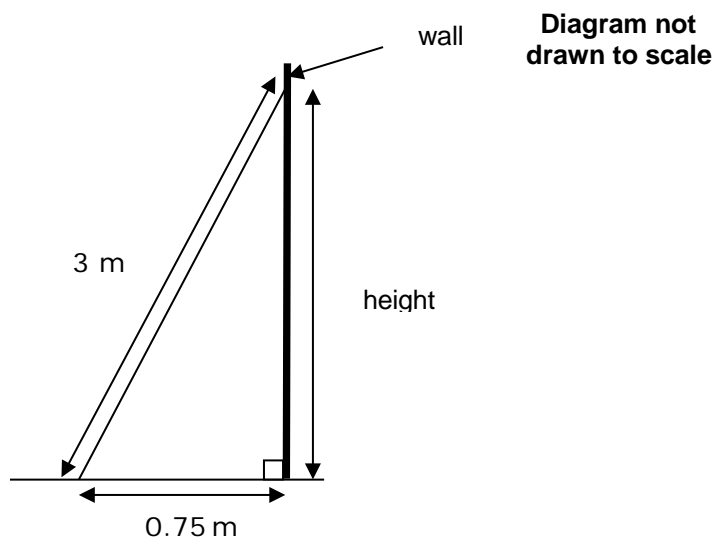
Which calculation gives the height of the point at which the ladder touches the wall?

A	$\sqrt{(3^2 + 0.75^2)}$	
B	$\sqrt{(3 - 0.75)}$	
C	$\sqrt{(3 + 0.75)}$	
D	$\sqrt{(3^2 - 0.75^2)}$	

Questions 16 to 18 are about ventilation systems.

16   This formula is used to find the size of a ventilation fan for a room.

$$F = \frac{V\,A}{60}$$

F = fan size (m³/min)
V = volume of room (m³)
A = air changes per hour

A fan of size $7\,m^3$ is used in a room with a floor area of $25\,m^2$ and a height of 3 metres.

What is the number of air changes per hour?

A	1.25	
B	5.2	
C	5.6	
D	8.75	

17   A fan of size $3\,m^3$ per minute changes the air in a room 5 times per hour.

$$F = \frac{V\,A}{60}$$

F = fan size (m³/min)
V = volume of room (m³)
A = air changes per hour

What is the maximum volume of the room where the fan can be installed?

A	11.4 m³	
B	12.6 m³	
C	30.0 m³	
D	36.0 m³	

18   A busy kitchen has a ventilation fan.
      The capacity of the fan is 700 cubic feet per minute (ft³/min).
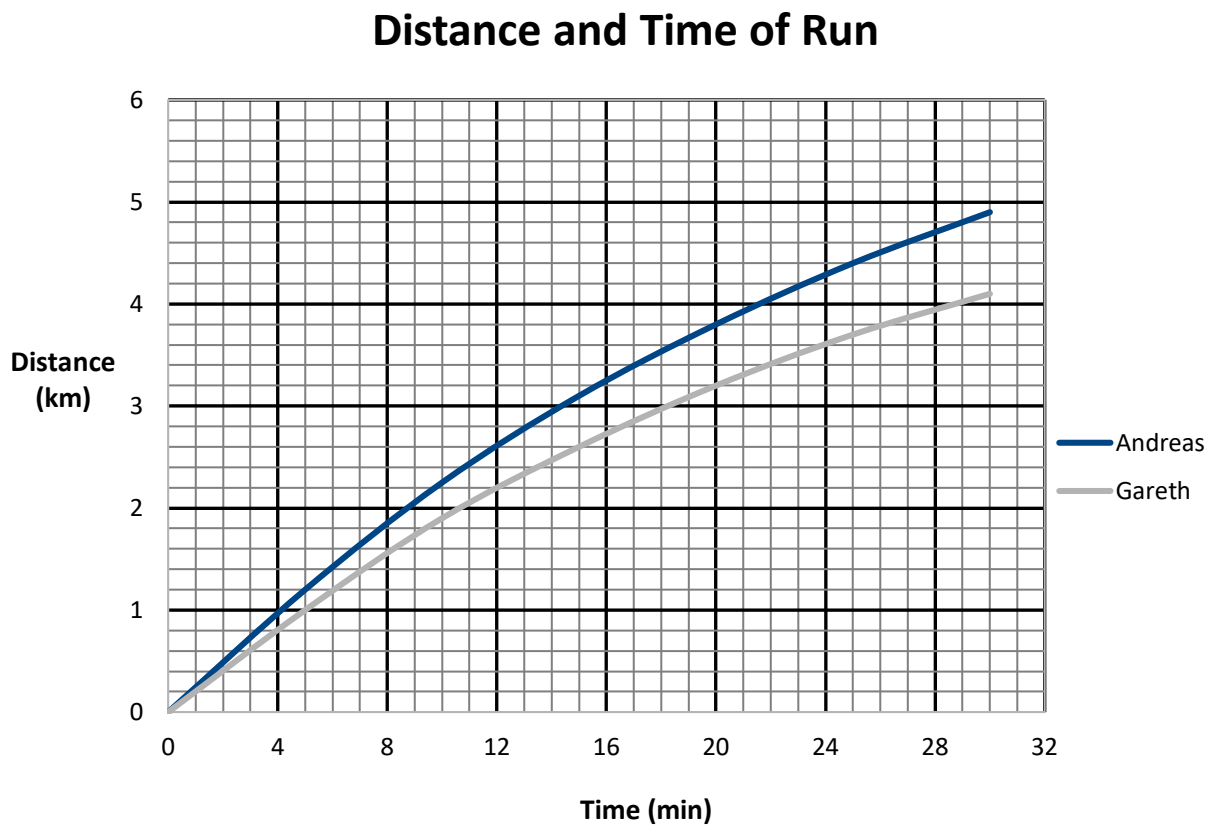
      Use this information:

      $$1 \text{ m}^3 = 35 \text{ ft}^3$$

      What is the capacity of the fan in cubic metres per hour (m³/h)?

A	2100 m³/h	
B	1200 m³/h	
C	408 m³/h	
D	333 m³/h	

Questions 19 to 21 are about running.

19   Andreas and Gareth go running for 30 minutes. This graph shows the distance they had covered over time.

Distance and Time of Run

What was the distance between the runners after a quarter of an hour?

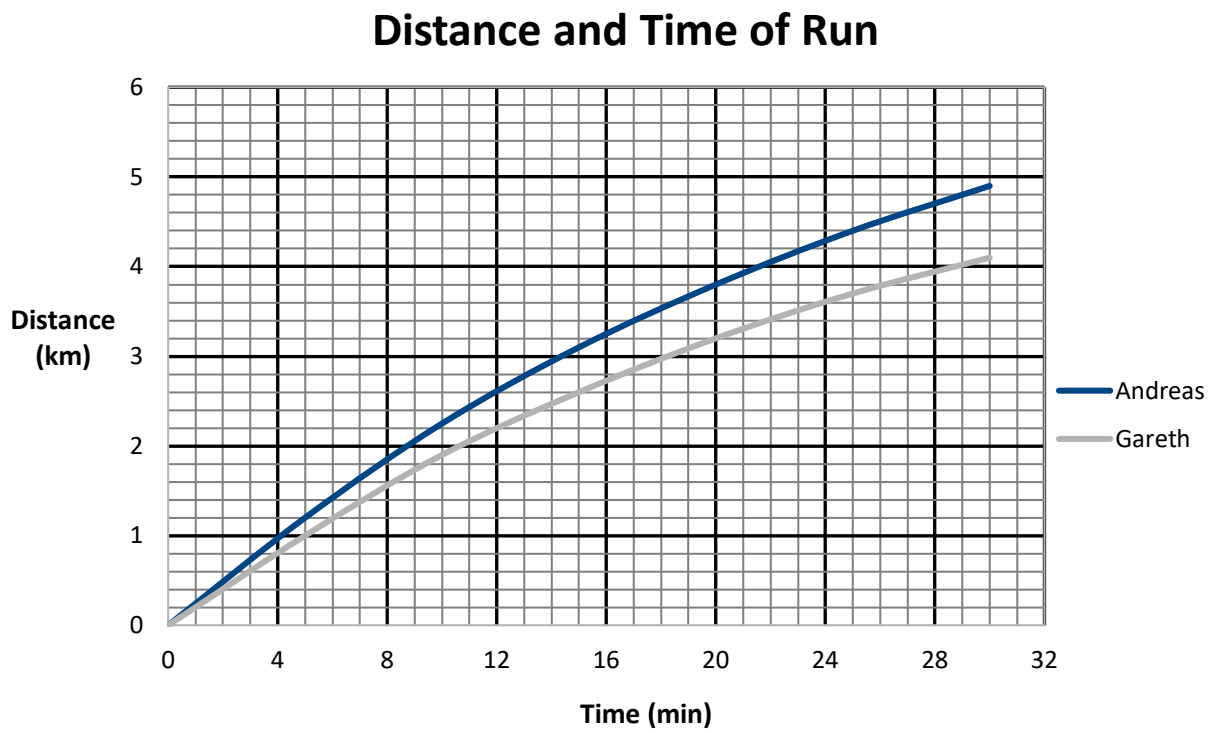| A	50 metres	
B	250 metres	
C	500 metres	
D	2500 metres	

20   Andreas and Gareth go running for 30 minutes. This graph shows the distance they
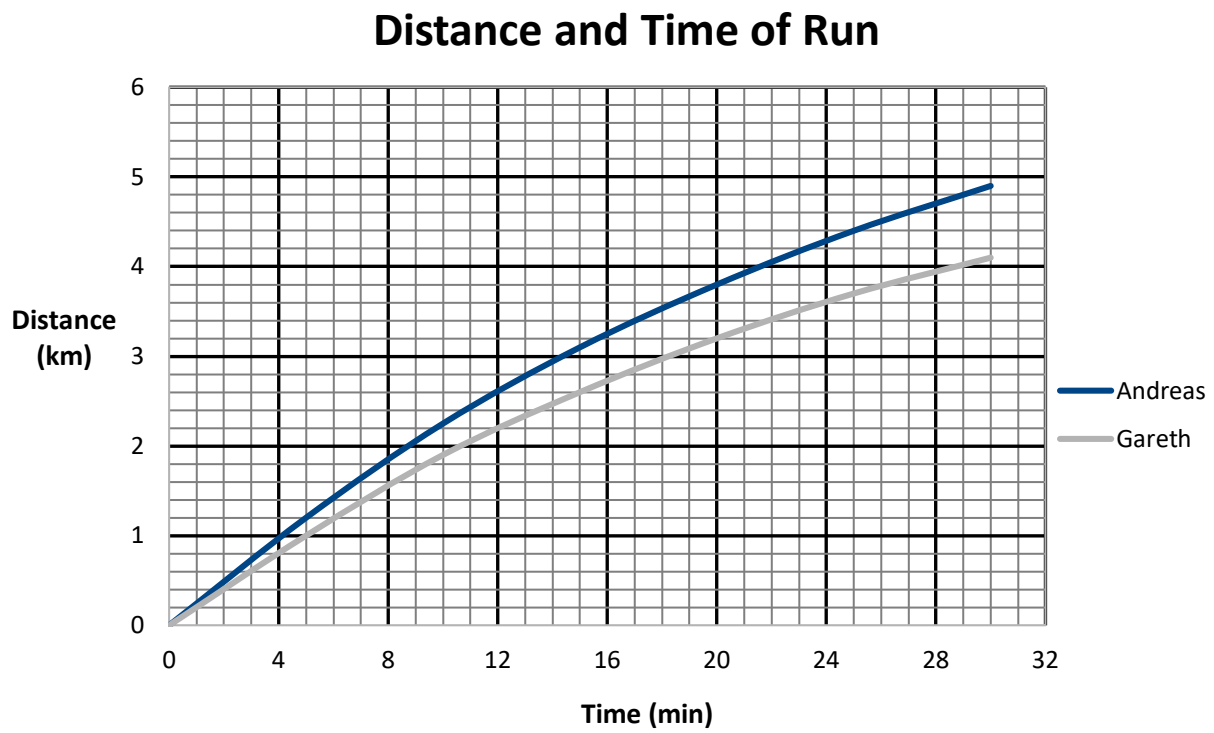   had covered over time.

Distance and Time of Run

What was Andreas' average speed for the run?

A	13.0 km/h	
B	11.4 km/h	
C	9.8 km/h	
D	2.45 km/h	

21   Andreas and Gareth go running for 30 minutes. This graph shows the distance they
      had covered over time.

Distance and Time of Run

What was Gareth's average speed over the first kilometre, in metres per second?

A	0.3 m/s	
B	3.3 m/s	
C	12.0 m/s	
D	16.7 m/s	

Questions 22 to 24 are about blood groups.

22   In the UK 3% of the population has blood group AB positive.

      The population of the UK is 6.4×10^7

      How many people in the UK have the blood group AB positive?

A	1.92×10^6	
B	1.92×10^7	
C	2.13×10^6	
D	2.13×10^7	

23   There are 1.28 million people in the UK with blood group B negative.

      The population of the UK is 6.4×10^7

      What is the proportion of people in the UK with blood group B negative?

A	1 in 5	
B	1 in 8	
C	1 in 50	
D	1 in 80	

24   The number of people in the UK with blood group A negative is 4.48×10^6

      The population of the UK is 6.4×10^7

      What percentage of the population has blood group A negative?

A	14.3 %	
B	7.0 %	
C	1.43 %	
D	0.7 %	

Questions 25 to 26 are about telephone call charges.

25   A telephone call starts at 09:57:30 and ends at 11:23:20

Each part minute is rounded up to the next whole minute.

Calls cost 25 pence per minute.

How much does the call cost?

A	£18.75	
B	£21.25	
C	£21.50	
D	£31.25	

26   A telephone bill is made up of a fixed monthly fee plus 25 pence per minute for calls made.

In 3 months, exactly 4 hours of calls are made. The total bill for the 3 months is £105

What is the fixed fee per month?

A	£15.00	
B	£20.00	
C	£28.33	
D	£45.00	

Questions 27 to 30 are about a scale model.

27   A model of a new office block is required by an architect. The height of the actual building is 44 metres.

The scale of the model will be 1 : 200

What is the height of the model in mm?

A	22 mm	
B	88 mm	
C	220 mm	
D	880 mm	

28   A flower bed on the model will be 6 inches long.

The scale of the model will be 1 : 200

1 inch = 2.5 centimetres

What is the length of the actual flower bed?

A	24 m	
B	30 m	
C	48 m	
D	300 m	

29   The area of the actual car park is 900 m^2

**Diagram not
drawn to scale**

20 m

Car Park

45 m
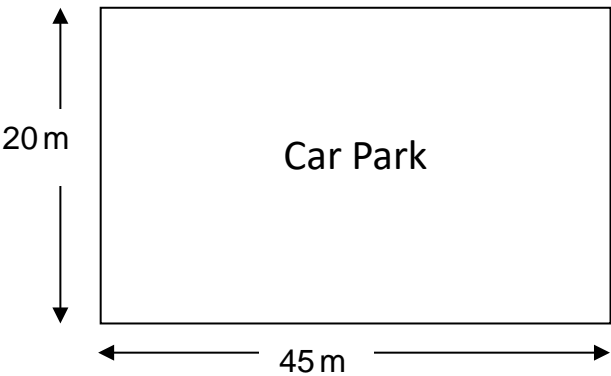
The scale of the model will be 1 : 200

What is the area of the car park on the model?

A	4.5 cm^2	
B	22.5 cm^2	
C	45 cm^2	
D	225 cm^2	

30   This is the plan of a floor of the office block.

Diagram not drawn to scale
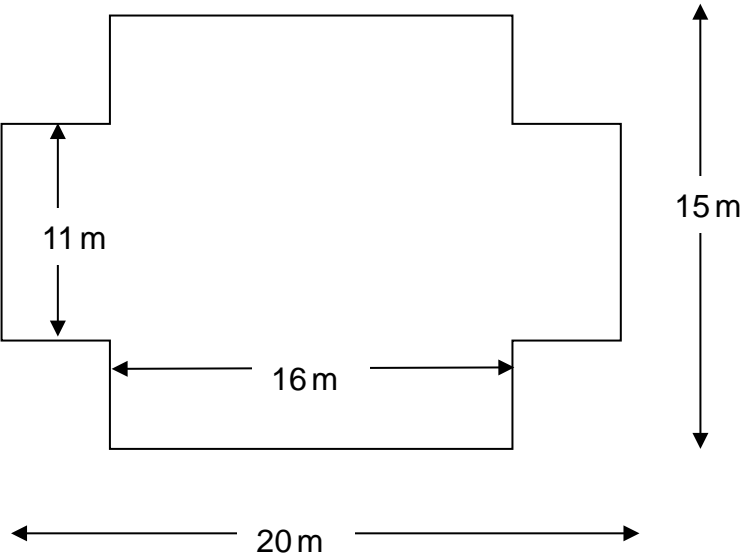
What is the area of the floor?

A	236 m²	
B	262 m²	
C	284 m²	
D	460 m²	