

MATHEMATICS AND STATISTICS — 30 QUESTIONS

Multiple choice · 50 minutes

Work through the questions in order, but do not spend too long on any one. Mark your best answer for every question, then check your work against the worked solutions.

1. Expand $3x(x - 2)$.

- A $3x - 6x$
- B $3x^2 + 6x$
- C $3x^2 - 6x$
- D $3x^2 - 2$

2. The right-angled triangle has shorter sides of 12 cm and 16 cm. What is the length of the hypotenuse?

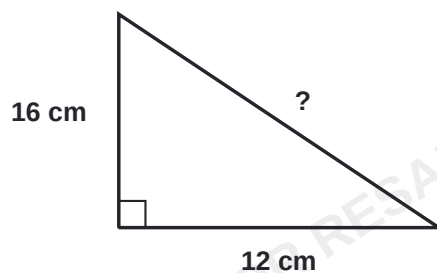


Diagram not drawn to scale.

- A 28 cm
- B 20 cm
- C 19 cm
- D 400 cm

3. A survey on school lunches is given only to the students in one Year 9 class. Which description fits this sampling method?

- A simple random sample: every student has an equal chance of being chosen
- B convenience sample from one place: it is not random and may be biased
- C volunteer response: people choose to take part, so the sample is biased
- D convenience sample: the other year groups are not represented

THE WORKED ANSWERS TO THOSE 3 QUESTIONS

1. Expand $3x(x - 2)$. [Expanding brackets]

Correct answer: C — $3x^2 - 6x$

- Multiply every term inside the bracket by the term outside.
- $3x(x - 2) = 3x^2 - 6x$.
- Why the other options are wrong:
- A ($3x - 6x$): Multiplied x by x and got x , not x^2 .
- B ($3x^2 + 6x$): Used the wrong sign.
- D ($3x^2 - 2$): Did not multiply the second term by $3x$.

Skill: Expanding brackets

KEY TAKEAWAY

Expanding: multiply each term in the bracket by the term outside.

2. The right-angled triangle has shorter sides of 12 cm and 16 cm. What is the length of the hypotenuse? [Pythagoras' theorem]

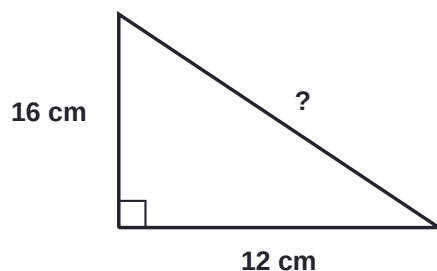


Diagram not drawn to scale.

Correct answer: B — 20 cm

- $c^2 = a^2 + b^2 = 12^2 + 16^2 = 144 + 256 = 400$.
- $c = \sqrt{400} = 20$ cm.
- Why the other options are wrong:

- A (28 cm): Added the sides: use Pythagoras, $c^2 = a^2 + b^2$.
- C (19 cm): A slip somewhere in the working: this is not the answer (the correct answer is 20 cm).
- D (400 cm): That is c^2 , not c : take the square root.

Skill: Pythagoras' theorem

KEY TAKEAWAY

Hypotenuse: $c^2 = a^2 + b^2$, then take the square root.

3. A survey on school lunches is given only to the students in one Year 9 class. Which description fits this sampling method? [Sampling methods]

Correct answer: D — convenience sample: the other year groups are not represented

- A simple random sample gives every member an equal chance. Convenience and volunteer samples are not random and tend to be biased.
- Convenience sample: the other year groups are not represented.
- Why the other options are wrong:
 - A: This describes a different sampling method: look at who was chosen and how.
 - B: This describes a different sampling method: look at who was chosen and how.
 - C: This describes a different sampling method: look at who was chosen and how.

Skill: Sampling methods

KEY TAKEAWAY

Random sampling avoids bias; convenience and volunteer samples can be biased.