EQUIVALENCE

1 C

2 B

3 Example of an appropriate method

Since these three figures are equivalent, they are equal in area.

Area of the square, the triangle and the rectangle

Are of square LMNO: $(63)^2 = 3969$ cm^2

Area of triangle ONP = Area of rectangle NRQP = Area of square LMNO = 3969 cm^2

Length of segment NP

Area of right triangle ONP: 3969 cm^2

$$\frac{m\,\overline{NP} \times m\,\overline{ON}}{2} = 3969$$

$$\frac{m\,\overline{NP} \times 63}{2} = 3969$$

$$m\,\overline{NP} = 126 \text{ cm}$$

Length of segment PQ

Area of rectangle NRQP: 3969 cm^2

$$m\,\overline{NP} \times m\,\overline{PQ} = 3969$$

$$126 \times m\,\overline{PQ} = 3969$$

$$m\,\overline{PQ} = 31.5 \text{ cm}$$

Answer The length of segment PQ is **31.5** cm.

Note: Students who use an appropriate method in order to determine the length of segment NP have shown that they have a partial understanding of the problem.

4 Example of an appropriate solution

Since the polygons are equivalent, their surface areas are equal.

Area of the rectangle = area of the square

$(2x - 8)(x - 3) = x^2$

$2x^2 - 14x + 24 = x^2$

$x^2 - 14x + 24 = 0$

$(x - 12)(x - 2) = 0$

$x = 12$ or $x = 2$

Dimensions of the rectangle

$(2x - 8)$ cm and $(x - 3)$ cm.

If $x = 12$, the dimensions are 16 cm and 9 cm.

If $x = 2$, the dimensions are -4 and -1 (to be rejected).

Answer The actual dimensions of the rectangle are 16 cm and 9 cm.

5 A

6 Example of an appropriate method

Value of x

$$x^2 + (3x - 12)^2 = 52^2 \qquad \text{(Pythagorean theorem)}$$
$$x^2 + 9x^2 - 72x + 144 = 2704$$
$$10x^2 - 72x - 2560 = 0$$
$$5x^2 - 36x - 1280 = 0$$
$$5x^2 - 100x + 64x - 1280 = 0$$
$$5x(x - 20) + 64(x - 20) = 0$$
$$(x - 20)(5x + 64) = 0$$
$$x = 20 \qquad \text{or} \qquad x = \frac{-64}{5}$$
$$\text{impossible}$$

Area of the triangle

$$\frac{x(3x - 12)}{2} = \frac{20(3(20) - 12)}{2} = \frac{20(48)}{2} = 480 \text{ cm}^2$$

Length of the base of the rectangle

Since the rectangle and the triangle are equivalent, they are equal in area.

Area of the rectangle

480 cm^2

Length of the base of the rectangle

$$\frac{480\ \text{cm}^2}{15\ \text{cm}} = 32\ \text{cm}$$

Answer: The numerical length of the base of the rectangle is **32** cm.

Note: Students who use an appropriate method in order to determine the value of *x* have shown that they have a partial understanding of the problem.

Name : _____

Group : _____

Date : _____

568436 - Mathematics

Question Booklet

1 Which of the following statements are TRUE?

1. All cubes are similar.

2. All right pyramids whose base is 100 cm^2 and whose height is 8 cm are isometric.

3. If the dimensions of two right prisms with rectangular bases are respectively 4 cm by 5 cm by 6 cm and 3 cm by 4 cm by 10 cm, these prisms are equivalent.

A) 1, 2 and 3

B) 1 and 2 only

C) 1 and 3 only

D) 2 and 3 only

2 Which of the following statements is true?

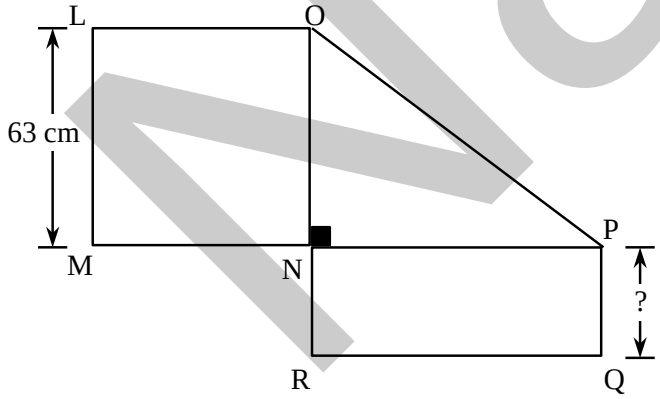
A) Two similar squares are always isometric.

B) Two equivalent squares are always isometric.

C) Two similar triangles are always isometric.

D) Two equivalent triangles are always isometric.

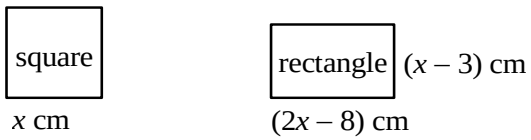
3 Square LMNO, right triangle ONP, and rectangle NRQP given below are equivalent. Segment LM measures 63 cm.



What is the length of segment PQ?

Show all your work.

4 The following square and rectangle are equivalent.



What are the actual dimensions of the rectangle?

Show all your work.

5 Which of the following statements is always true?

A) If two spheres are equivalent, then they are congruent.

B) If two right circular cylinders are equivalent, then they are congruent.

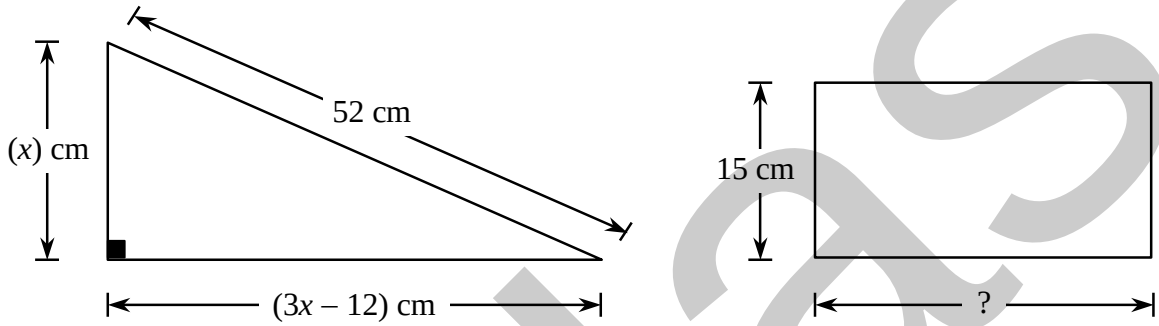
C) If two right pyramids with square bases are equivalent, then they are congruent.

D) If two right rectangular prisms are equivalent, then they are congruent.

6 The right triangle and the rectangle given below are equivalent.

The hypotenuse of the triangle measures 52 cm. The sides of the right angle of the triangle measure (x) cm and ($3x - 12$) cm respectively.

The height of the rectangle is 15 cm.



What is the numerical length of the base of the rectangle?

Show all your work.