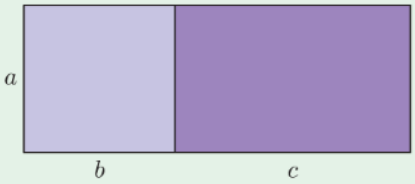
REVIEW SET 3A

1 Use the diagram alongside to show that $a(b+c) = ab + ac$.



2 Expand and simplify:

a $(x+5)(x-6)$ **b** $(2x+5)(3x-1)$

c $(x+3)(x+2) - (2x-1)(x-6)$

3 Fully factorise:

a $7x^2 - 4x$ **b** $x^3 + 5x^2 - 6x$ **c** $x(x-8) + 5(x-8)$

4 Expand and simplify:

a $(x+5)(x-2)(x+1)$ **b** $(2x-3)(x^2+4x+2)$

5 Fully factorise:

a $16 - 9m^2$ **b** $x^3 - 81x$ **c** $(x+7)^2 - 25$

6 Expand and simplify:

a $(t+7)(t-7)$ **b** $(2y+5)(2y-5)$ **c** $(2m-5n)^2$

7 Fully factorise:

a $2x^2 + 20x + 50$ **b** $2b - dc + 2d - bc$

8 Fully factorise:

a $x^2 + 7x - 18$ **b** $3x^2 - 9x - 30$ **c** $64 - 2x^2 + 8x$

9 Fully factorise:

a $8x^2 + 10x + 3$ **b** $5x^2 - 13x + 6$ **c** $-9x^2 + 3x + 2$

10 **a** Show that $(2x+9)^2 - (x-3)^2 = 3x^2 + 42x + 72$ by expanding the LHS.

b Factorise $3x^2 + 42x + 72$ by first taking out a common factor.

c Factorise $(2x+9)^2 - (x-3)^2$ using the difference of two squares.

REVIEW SET 3B

1 Expand and simplify:

a $5(4x-5)$ **b** $-4x(x-3)$ **c** $2(x+6)+x(3x-7)$

2 Expand and simplify:

a $x(x^2-3)+5(x-4)$ **b** $(a+b)(a-b)-(a+2b)(a-2b)$

3 Fully factorise:

a $2x^2-98$ **b** $(3x+1)^2-(x-4)^2$

4 Answer the **Opening Problem** on page **48**.

5 Fully factorise:

a $x^2+3x-54$ **b** $3x^2+24x+48$

6 How many terms would you obtain by expanding $(a+b+c+d)(e+f)(g+h)$?

7 Fully factorise:

a $x^2-5x-66$ **b** $2x^2+20x-78$ **c** $4x^2-8x-21$

8 Expand and simplify:

a $(3x^2-5)^2$ **b** $(x^2-x+4)(x^2+2x+3)$

9 Fully factorise:

a $-x^2+x+12$ **b** $-6x^2-5x+50$

10 Consider factorising the expression $6x^2+17x+12$.

a Explain why the middle term $17x$ should be 'split' into $9x$ and $8x$.

b Factorise $6x^2+17x+12$ by writing $17x$ as $9x+8x$.

c Now factorise $6x^2+17x+12$ by writing $17x$ as $8x+9x$. Check that you get the same answer as in **b**.

REVIEW SET 5A

1 Answer the **Opening Problem** on page **80**.

2 Write down the equation which results when:

a 4 is subtracted from both sides of $2x + 4 = 11$

b both sides of $\frac{x+4}{3} = -1$ are multiplied by 3

c 7 is added to both sides of $3x - 7 = -5$

d both sides of $-4x = 16$ are divided by -4.

3 Solve for x:

a $2x + 5 = 13$ **b** $9 = 5x + 14$ **c** $7 + 4x = -5$

d $3 - 2x = 11$ **e** $-4x - 3 = 13$ **f** $15 = 4 - 11x$

4 Solve for x:

a $\frac{x}{2} = -3$ **b** $\frac{x}{5} = \frac{4}{7}$ **c** $\frac{x+1}{3} = -2$

d $\frac{3-2x}{7} = -5$ **e** $\frac{1}{3}(3 - x) = 2$ **f** $\frac{3x}{7} - 5 = -2$

5 Solve for x:

a $2(x + 1) - x = 3$ **b** $3x - (x - 5) = 9$

c $3(1 - x) + 2(x + 3) = 7$ **d** $2(x + 4) + 3(5 - 2x) = 8$

6 Solve for x:

a $3x - 1 = 2x + 5$ **b** $2(3x - 1) + 4 = 4(x - 3)$

c $\frac{4x+5}{3} = \frac{x}{2}$ **d** $\frac{1-3x}{4} = \frac{x-2}{2}$

7 When a number is increased by 11 and the result is doubled, the answer is 48. Find the number.

8 The sum of three consecutive integers is 63. Find the smallest of the integers.

9 When 7 times a certain number is decreased by 11, the result is 31 more than the number. Find the number.

10 I have 25 coins consisting of 5-cent and 50-cent pieces. If the total value is \$7.10, how many 5-cent coins do I have?

REVIEW SET 5B

1 Write down the equation which results when:

a both sides of $\frac{6-x}{2} = -\frac{1}{2}$ are multiplied by 2

b 3 is added to both sides of $5x - 3 = 8$

c both sides of $3(2x - 1) = 6$ are divided by 3

d 11 is subtracted from both sides of $9x + 11 = 20$.

2 Solve for x:

a $13 = 2x - 7$ **b** $5x - 4 = 16$ **c** $11 + 3x = -4$

d $-3x - 1 = 8$ **e** $-12 - 5x = 13$ **f** $16 = 2 - 3x$

3 Solve for x:

a $\frac{x}{-4} = 5$ **b** $\frac{x}{2} = \frac{3}{8}$ **c** $\frac{4-x}{3} = -1$

d $\frac{5x+3}{2} = -6$ **e** $\frac{1}{4}(2 - 3x) = 5$ **f** $2 - \frac{3x}{5} = -1$

4 Solve for x:

a $6x - 2(x - 5) = 8$ **b** $3(4 - 3x) + 6x = 15$

c $2(3x + 1) - 3(x - 2) = 5$ **d** $5(2x - 3) - (3 - x) = -14$

5 Solve for x:

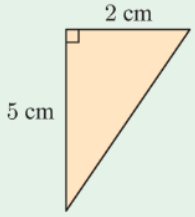
a $3 - x = 4x - 7$ **b** $2(3 - 2x) = 3(4 - x) - 5$

c $3(2x - 1) + 9 = 2(x + 7)$ **d** $\frac{2x+1}{3} = \frac{4-x}{6}$

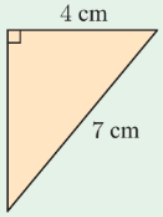
REVIEW SET 6A

1 Find the length of the unknown side in each of the following triangles:

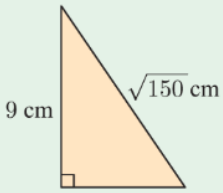
a



b

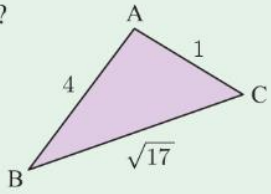


c



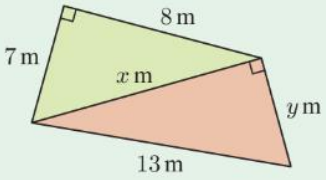
2 Determine whether $\{5, 11, 13\}$ is a Pythagorean triple.

3 Is this triangle right angled? Explain your answer.

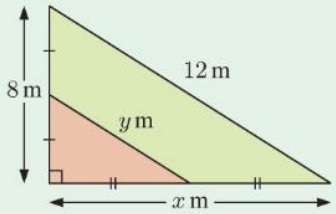


4 Find the values of the unknowns:

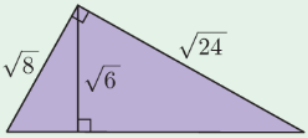
a



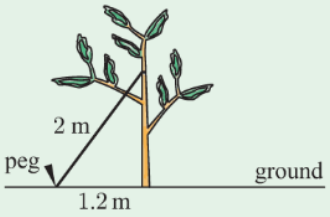
b



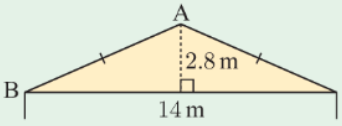
5 Use the figure alongside to show that $\sqrt{2} + \sqrt{18} = \sqrt{32}$.



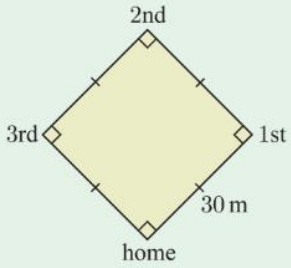
6 A young tree has a 2 m support rope tied to a peg in the ground 1.2 m from its base. How high up the tree is the rope tied?



7 Find the length of the truss AB for the roof structure shown.



8 A softball diamond has sides of length 30 m.
Determine the distance a fielder must throw the ball from second base to reach home base.



9 Mia and Yvette leave home at the same time. Mia walks east at 5 km h^{-1} and Yvette walks at 4 km h^{-1} in another direction. After 90 minutes they are approximately 9.6 km apart.

a How far do they each walk in 90 minutes?

b Show that Yvette travelled at right angles to Mia.

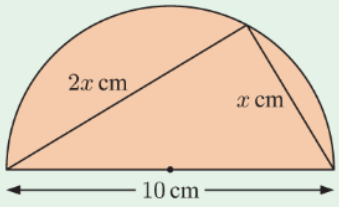
c What directions might Yvette have walked in?

10 A rectangle has diagonals 15 cm long, and one side is 8 cm long. Find the perimeter of the rectangle.

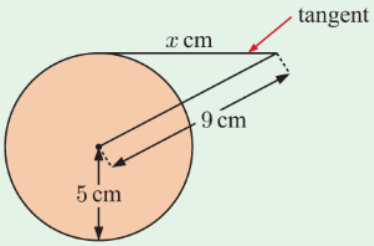
11 A circle has a chord of length 10 cm. The shortest distance from the circle's centre to the chord is 5 cm. Find the radius of the circle.

12 Find x:

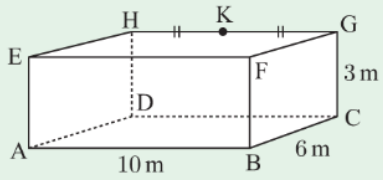
a



b



13



A room is 10 m by 6 m by 3 m.
Find the shortest distance from:

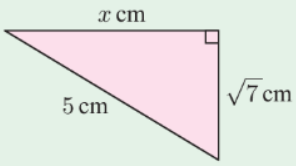
a E to K

b A to K.

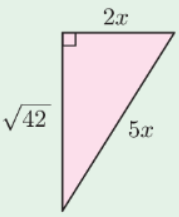
REVIEW SET 6B

1 Find the value of x in the following:

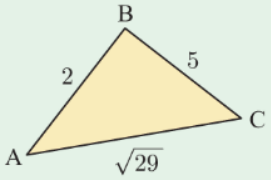
a



b



2 Show that this triangle is right angled, and identify which is the right angle.



3 Find k given that $\{12, k, 37\}$ is a Pythagorean triple.

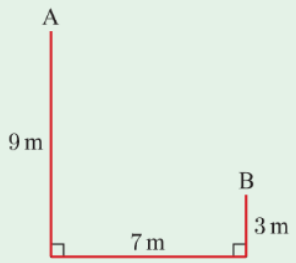
4 The diameter of a circle is 20 cm. Find the shortest distance from a chord of length 16 cm to the centre of the circle.

5 A landscaped garden is 25 metres square. Find the length of a path from one corner to the opposite corner.

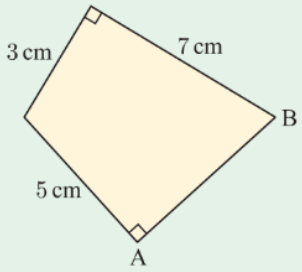
6 A fishing boat is 8 km west and 15 km south of its port. How far must it sail if it returns to port by the shortest distance?

7 Find the distance AB in the following figures:

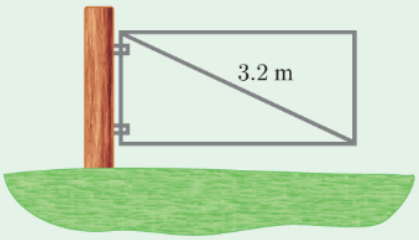
a



b



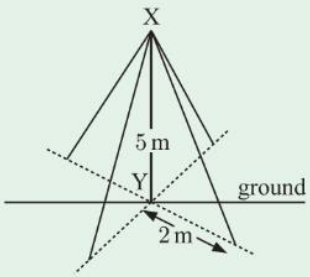
8 A rectangular gate is twice as wide as it is high. It is held in shape by a diagonal strut 3.2 m long. Find the height of the gate to the nearest millimetre.



9 A 15 m ladder reaches three times as far up a vertical wall as the base is out from the wall. How far up the wall does the ladder reach?

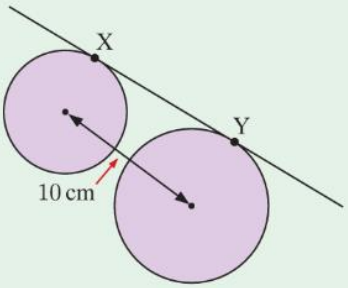
10 Can a wooden beam 10.5 m long be placed in a rectangular shed 8 m by 7 m by 3 m?

11

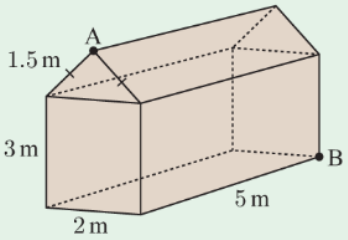


A pole [XY] is 5 metres tall. Four wires from the top of the pole X connect it to the ground.
Each wire is pegged 2 metres from the base of the pole. Find the total length of the four wires.

12 Two circles have a common tangent with points of contact X and Y.
The radii of the circles are 4 cm and 5 cm respectively, and the distance between the centres is 10 cm.
Find the length of the common tangent [XY].



13

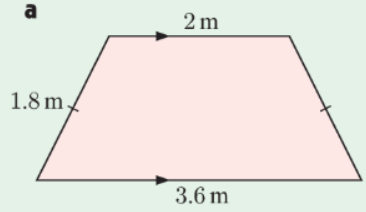


A barn has the dimensions given.
Find the shortest distance from A to B.

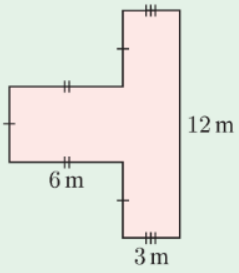
REVIEW SET 7A

1 Find the perimeter and area of each figure:

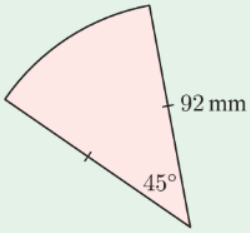
a



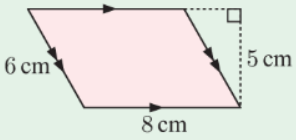
b



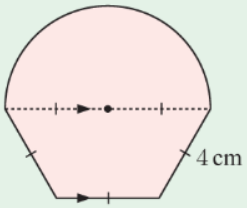
c



d



e



2 A rectangular bathroom measuring 3 m by 2 m is to be decorated on all walls with a single row of patterned tiles. There is a doorway measuring 90 cm wide. Each patterned tile is 15 cm long and costs $5. Find:

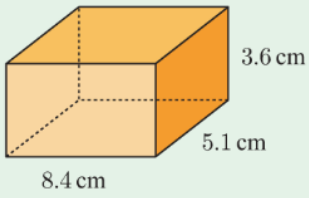
a the total length of patterned tiles required

b the total cost of the tiles.

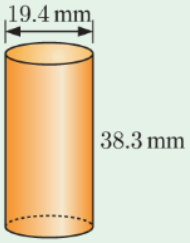
3 Competitors in a mountain-biking race complete four laps of an 8.5 km circuit. If the winning time is 1 hour 33 minutes, find the average speed of the winner.

4 Find the outer surface area of:

a

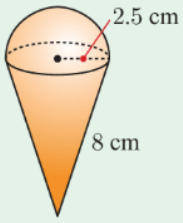


b



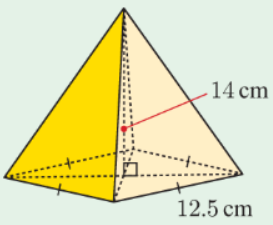
hollow top

c

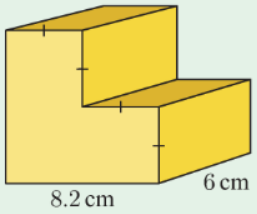


5 Find the volume of the following solids:

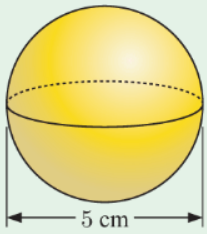
a



b

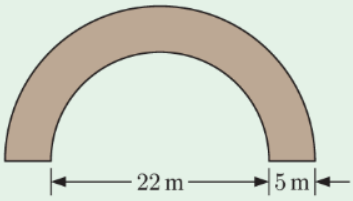


c



6 After a heavy rain it was found that the water level in a cylindrical tank had risen by 45 cm. If the radius of the tank is 1.2 m, find the volume of water collected.

7 A semi-circular tunnel with the dimensions shown is made of concrete. The tunnel is 220 m long, and the concrete costs €256 per m^3.



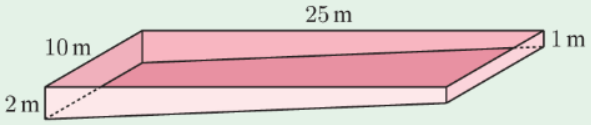
a Find the cross-sectional area of the tunnel.

b Find the volume of concrete used in the tunnel.

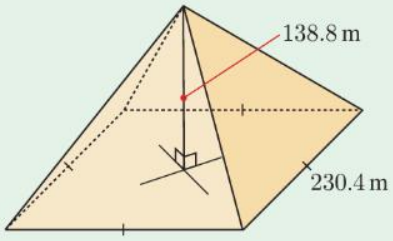
c Find the cost of the concrete.

8 **a** Find the capacity of a swimming pool with the dimensions shown.

b If the pool was filled to a depth 10 cm from the top, how much water would it contain?



9 The Pyramid of Khufu in Egypt has a square base with sides 230.4 m and a height of 138.8 m.



a Find the total volume of the pyramid.

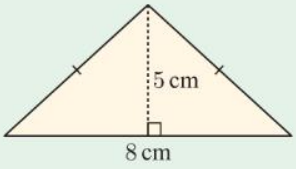
b If each cubic metre of stone weighs 2.67 tonnes, find the total mass of stone used. Give your answer in scientific notation. (Assume the pyramid is solid stone for this part.)

c The King's Chamber in the pyramid is rectangular and measures 10.47 m by 5.23 m by 5.97 m. Find the capacity of the chamber.

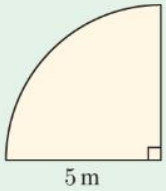
REVIEW SET 7B

1 Find the perimeter and area of each figure:

a



b



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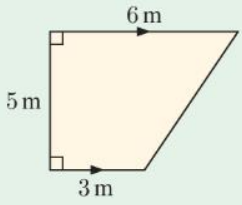

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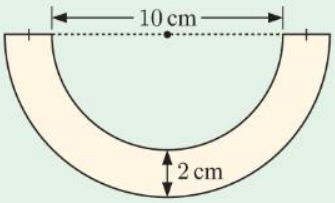
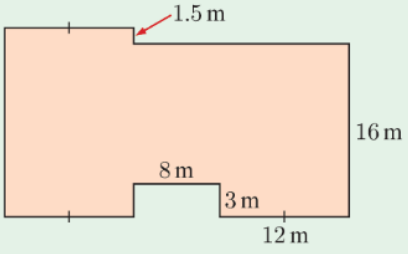


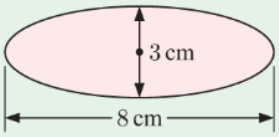
2 New guttering is to be installed around the perimeter of the house with floorplan shown.

a Find the perimeter of the house.

b If the guttering costs \$30 per metre, find the total cost.

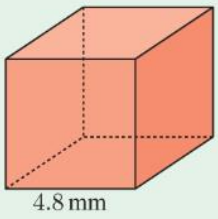


3 Find the area of the ellipse:



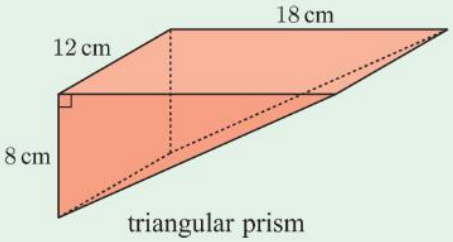
4 Find the outer surface area of:

a



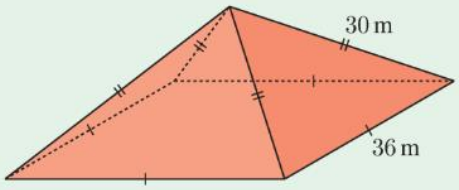
cube

b



triangular prism

c



square-based pyramid

d

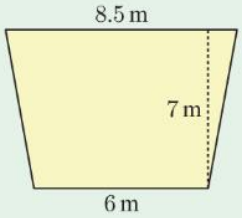
hollow throughout

5 The moon is approximately spherical with radius 1737 km. Estimate:

a the distance around the equator of the moon

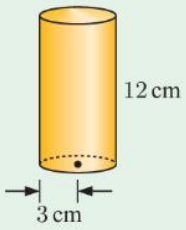
b the surface area of the moon.

6 The diagram shows the cross-section of a railway cutting that needs to be excavated. The cutting will be 56 m long. Find the volume of soil that needs to be excavated.

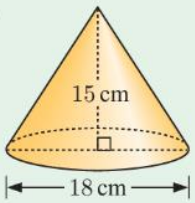


7 Find the volume of the following solids:

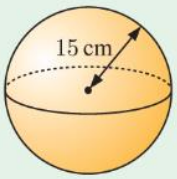
a



b



c

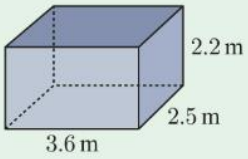


8 A security-conscious man builds himself a round fort of radius 10 m. He surrounds it with a moat 3 m wide. A large dog patrols on the other side of the moat to deer anyone who may attempt to cross it. The dog makes 150 complete circuits of the moat every day. How far does the dog walk every day?

9 Water enters the tank shown at the rate of 60 L per minute.

a Find the capacity of the tank.

b How long will it take to fill the tank?



10 The Pantheon in Rome was built during the reign of emperor Augustus around 27 BC, and rebuilt by the emperor Hadrian around 126 AD. Its centre is designed as a hemisphere on a cylinder so that a sphere with diameter 43.3 m will fit exactly inside it.
Find the capacity of this chamber in kL.