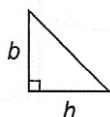
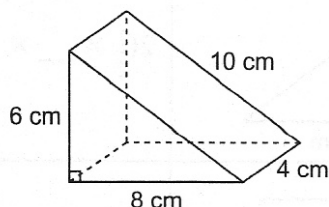


## 1.4 Skill Builder

### Surface Areas of Triangular Prisms

To find the surface area of a right triangular prism, add the areas of its 5 faces.  
Look for matching faces with the same areas.



$$A = \frac{1}{2}bh$$

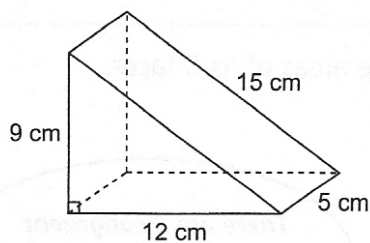
There are 2 congruent triangular faces. Find the area of one, then multiply it by 2.

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Triangular		$2\left(\frac{1}{2} \times 6 \times 8\right) = 48$
Rectangular		$10 \times 4 = 40$
		$6 \times 4 = 24$
		$8 \times 4 = 32$
<b>Total</b>		<b>144</b>

The surface area is 144 cm<sup>2</sup>.

## Check

1. Find the surface area of the triangular prism.



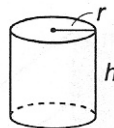
Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Triangular		$2\left(\frac{1}{2} \times \_ \times \_ \right) = \_$
Rectangular		$\_ \times \_ = \_$
		$\_ \times \_ = \_$
		$\_ \times \_ = \_$
Total		$\_$

The surface area is  $\_ \text{ cm}^2$ .

## Surface Areas of Cylinders

To find the surface area of a right cylinder, add the areas of:

- the 2 circular faces
- the curved surface



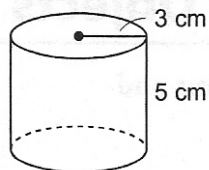
Look for matching faces with the same areas.

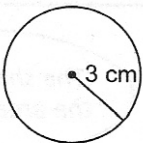
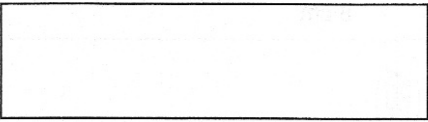
Matching Faces	Diagram	Corresponding Area
Top Bottom		$2 \times \pi r^2$
Curved surface		$2\pi rh$

The side can be unrolled into a rectangle, whose length is the circumference of the circle.

The surface area is:  $2\pi r^2 + 2\pi rh$

To calculate the surface area of this cylinder:



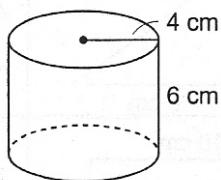
Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Top Bottom		$2 \times \pi \times 3^2$ $\doteq 56.55$
Curved surface		$2 \times \pi \times 3 \times 5$ $\doteq 94.25$
<b>Total</b>		150.80

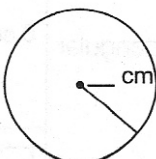
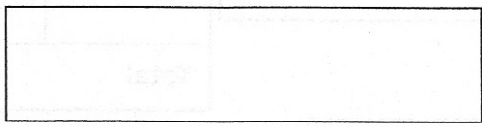
The dimensions of the cylinder are given to the nearest centimetre, so we give the surface area to the nearest square centimetre.

The surface area is about 151 cm<sup>2</sup>.

### Check

1. Find the surface area of the cylinder.



Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Top Bottom		$\_\_ \times \_\_ \times \_\_$ $\doteq \_\_\_\_\_\_$
Curved surface		$\_\_ \times \_\_ \times \_\_ \times \_\_$ $\doteq \_\_\_\_\_\_$
<b>Total</b>		$\_\_\_\_\_\_$

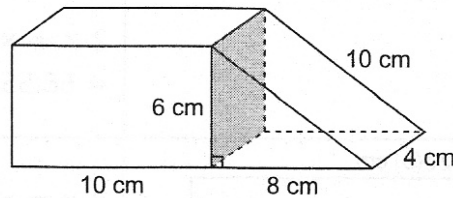
The surface area is about  $\_\_\_\_\_\_ \text{ cm}^2$ .

## 1.4 Surface Areas of Other Composite Objects

**FOCUS** Find the surface areas of composite objects made from right prisms and right cylinders.

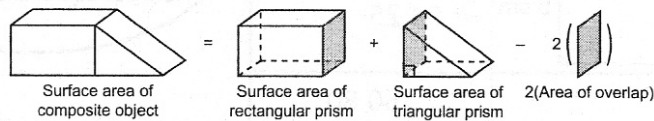
### Example 1 Finding the Surface Area of a Composite Object Made from a Rectangular Prism and a Triangular Prism

Find the surface area of this composite object.



The shaded area is the area of overlap.

#### Solution



#### Surface area of rectangular prism

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Front Back		$2(6 \times 10) = 120$
Top Bottom		$2(10 \times 4) = 80$
Right Left		$2(6 \times 4) = 48$
<b>Total</b>		<b>248</b>

The surface area is 248 cm<sup>2</sup>.

#### Area of overlap

Diagram	Corresponding Area (cm <sup>2</sup> )
	$6 \times 4 = 24$

#### Surface area of triangular prism

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Triangular		$2\left(\frac{1}{2} \times 6 \times 8\right) = 48$
Rectangular		$10 \times 4 = 40$
		$6 \times 4 = 24$
		$8 \times 4 = 32$
<b>Total</b>		<b>144</b>

The surface area is 144 cm<sup>2</sup>.

The area of overlap is 24 cm<sup>2</sup>.

Surface area of composite object =  $248 + 144 - 2(24) = 344$

The surface area of the composite object is 344 cm<sup>2</sup>.



## Check

1. The diagram shows the surface area of the two prisms that make up a composite object.

a) What is the area of the overlap?

The overlap is a \_\_\_\_-cm by \_\_\_\_-cm rectangle.

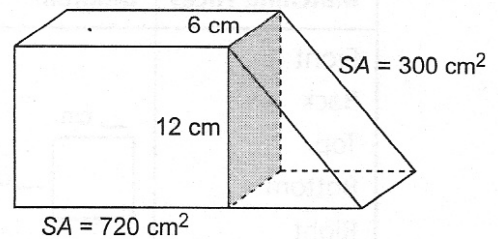
Area of overlap = \_\_\_\_ cm  $\times$  \_\_\_\_ cm = \_\_\_\_ cm<sup>2</sup>

b) What is the surface area of the composite object?

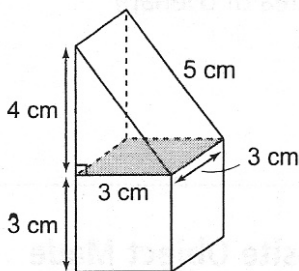
Surface area of composite object = Surface area of 2 prisms - 2(Area of overlap)

= \_\_\_\_ + \_\_\_\_ - \_\_\_\_ = \_\_\_\_

The surface area of the composite object is \_\_\_\_.



2. Find the surface area of this composite object.

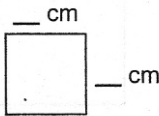


Surface area of triangular prism

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Triangular		$2(\frac{1}{2} \times 3 \times 4) = \underline{\hspace{2cm}}$
Rectangular		$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$
		$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$
		$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$
Total		$\underline{\hspace{2cm}}$

The surface area is \_\_\_\_ cm<sup>2</sup>.

### Surface area of cube

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Front Back Top Bottom Right Left		$6(\text{ } \times \text{ }) = \text{ }$
<b>Total</b>		$\text{ }$

The surface area is  $\text{ } \text{cm}^2$ .

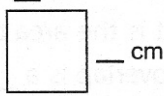
Surface area of composite object = Surface area of 2 prisms – 2(Area of overlap)

$$= \text{ } + \text{ } - \text{ }$$

$$= \text{ }$$

The surface area of the composite object is  $\text{ } \text{cm}^2$ .

### Area of overlap

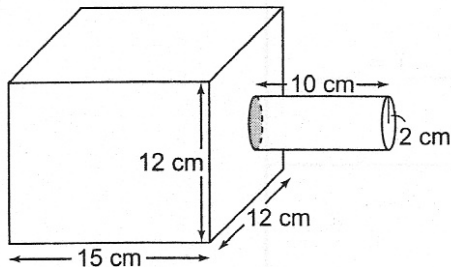
Diagram	Corresponding Area (cm <sup>2</sup> )
	$\text{ } \times \text{ } = \text{ }$

The area of overlap is  $\text{ } \text{cm}^2$ .

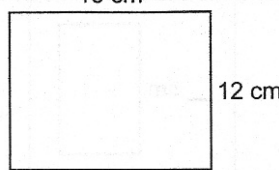
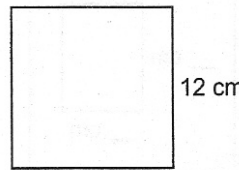
### Example 2

### Finding the Surface Area of a Composite Object Made from a Rectangular Prism and a Cylinder

Find the surface area of this object.

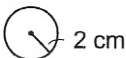
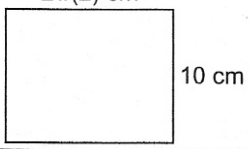


### Surface area of rectangular prism

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Front Back Top Bottom		$4(12 \times 15) = 720$
Right Left		$2(12 \times 12) = 288$
<b>Total</b>		1008

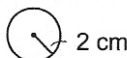
The surface area is  $1008 \text{ cm}^2$ .

### Surface area of cylinder

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Top Bottom	 2 cm	$2 \times \pi \times 2^2 \doteq 25.13$
Curved surface	 2π(2) cm 10 cm	$2 \times \pi \times 2 \times 10 \doteq 125.67$
<b>Total</b>		150.80

The surface area is about 150.80 cm<sup>2</sup>.

### Area of overlap

Diagram	Corresponding Area (cm <sup>2</sup> )
 2 cm	$\pi \times 2^2 \doteq 12.57$

The area of overlap is about 12.57 cm<sup>2</sup>.

$$\begin{aligned}
 \text{SA composite object} &= \text{SA rectangular prism} + \text{SA cylinder} - 2(\text{Area of overlap}) \\
 &\doteq 1008 + 150.80 - 2(12.57) \\
 &\doteq 1133.66
 \end{aligned}$$

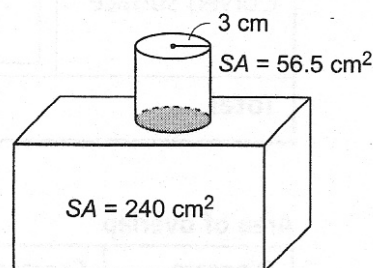
The surface area is about 1134 cm<sup>2</sup>.

## Check

1. The diagram shows the surface area of the rectangular prism and cylinder that make up a composite object.

- a) What is the area of the overlap?

The overlap is a \_\_\_\_\_.  
 Area of overlap = \_\_\_\_\_  
 $\doteq$  \_\_\_\_\_ cm<sup>2</sup>

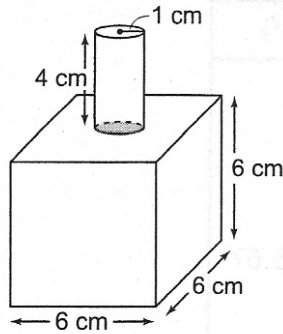


- b) What is the surface area of the composite object?

$$\begin{aligned}
 \text{SA composite object} &= \text{SA} \text{ _____} + \text{SA} \text{ _____} - 2(\text{ _____}) \\
 &= \text{ _____} + \text{ _____} - \text{ _____} \\
 &= \text{ _____}
 \end{aligned}$$

The surface area of the composite object is about \_\_\_\_\_ cm<sup>2</sup>.

2. Find the surface area of this composite object.



**Surface area of cube**

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Front Back Top Bottom Right Left		$6(\text{ } \times \text{ }) = \text{ }$
<b>Total</b>		$\text{ }$

**Surface area of cylinder**

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Top Bottom		$\text{ } \times \text{ } \times \text{ } \div \text{ }$
Curved surface		$\text{ } \times \text{ } \times \text{ } \times \text{ } \div \text{ }$
<b>Total</b>		$\text{ }$

**Area of overlap**

Diagram	Corresponding Area (cm <sup>2</sup> )
	$\text{ } \times \text{ } \div \text{ }$

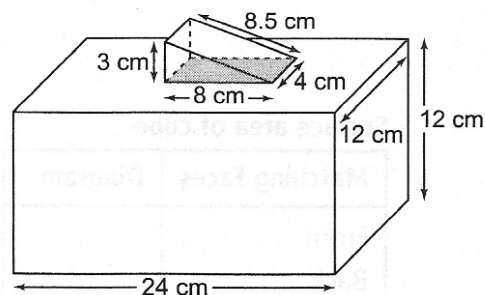
$$\begin{aligned}
 \text{SA composite object} &= \text{SA } \text{ } + \text{SA } \text{ } - 2(\text{ }) \\
 &\div \text{ } + \text{ } - \text{ } \\
 &\div \text{ }
 \end{aligned}$$

The surface area of the composite object is about  $\text{ } \text{cm}^2$ .



## Practice

1. Find the surface area of this composite object.



### Surface area of rectangular prism

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Front Back Top Bottom		_____ = _____
Right Left		_____ = _____
<b>Total</b>		_____

The surface area is \_\_\_\_\_ cm<sup>2</sup>.

### Surface area of triangular prism

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Triangular		_____
Rectangular		_____
		_____
		_____
<b>Total</b>		_____

The surface area is \_\_\_\_\_ cm<sup>2</sup>.

### Area of overlap

Diagram	Area (cm <sup>2</sup> )
	_____ × _____ = _____

The area of overlap is \_\_\_\_\_ cm<sup>2</sup>.

### Surface area of composite object

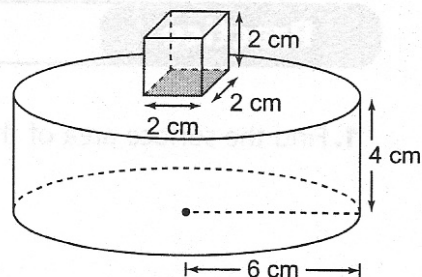
SA composite object

= \_\_\_\_\_

= \_\_\_\_\_

The surface area of the composite object is \_\_\_\_\_ cm<sup>2</sup>.

2. Find the surface area of this composite object.



### Surface area of cube

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Front		
Back		
Top		6(____ × ____ ) = ____
Bottom		
<b>Total</b>		_____

The surface area is \_\_\_\_ cm<sup>2</sup>.

### Surface area of cylinder

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Top		____ × ____ × ____ ÷ ____
Bottom		
Curved surface		____ × ____ × ____ × ____ ÷ ____
<b>Total</b>		_____

The surface area is about \_\_\_\_\_ cm<sup>2</sup>.

### Area of overlap

Diagram	Corresponding Area (cm <sup>2</sup> )
	____ × ____ = ____

The area of overlap is \_\_\_\_ cm<sup>2</sup>.

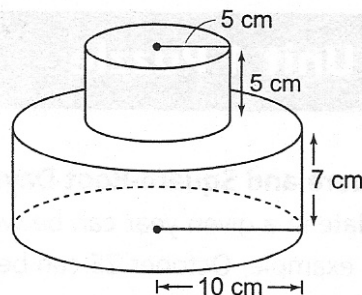
### Surface area of composite object

$$\text{SA composite object} \div \text{_____} + \text{_____} - \text{_____}$$

$$\div \text{_____}$$

The surface area of the composite object is about \_\_\_\_\_ cm<sup>2</sup>.

3. Calculate the surface area of the cake at the right.  
Write your answer to the nearest tenth.



**Surface area of smaller cake**

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Top Bottom		$\_\_\_ \times \_\_\_ \times \_\_\_ \div \_\_\_\_\_\_$
Curved surface		$\_\_\_ \times \_\_\_ \times \_\_\_ \times \_\_\_ \div \_\_\_\_\_\_$
<b>Total</b>		$\_\_\_\_\_\_$

The surface area is about  $\_\_\_\_\_\_ \text{ cm}^2$ .

**Surface area of larger cake**

Matching Faces	Diagram	Corresponding Area (cm <sup>2</sup> )
Top Bottom		$\_\_\_ \times \_\_\_ \times \_\_\_ \div \_\_\_\_\_\_$
Curved surface		$\_\_\_ \times \_\_\_ \times \_\_\_ \times \_\_\_ \div \_\_\_\_\_\_$
<b>Total</b>		$\_\_\_\_\_\_$

The surface area is about  $\_\_\_\_\_\_ \text{ cm}^2$ .

**Area of overlap**

Diagram	Corresponding Area (cm <sup>2</sup> )
	$\_\_\_ \times \_\_\_ \div \_\_\_\_\_\_$

The area of overlap is about  $\_\_\_\_\_\_ \text{ cm}^2$ .

Surface area of cake  $\div \_\_\_\_\_\_ + \_\_\_\_\_\_ - \_\_\_\_\_\_$   
 $\div \_\_\_\_\_\_$

The surface area of the cake is about  $\_\_\_\_\_\_ \text{ cm}^2$ .