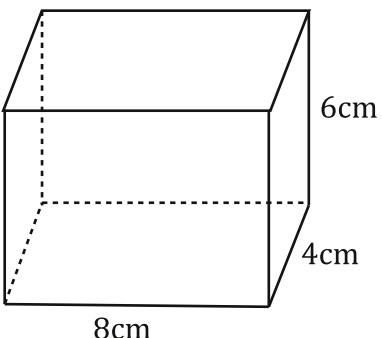# Surface Area

How to really paint your house....

Surface area is really nothing more than finding the area of figures.... except this time the polygons will be on prisms, pyramids, cylinders and cones. There are two kinds, Total Surface Area, (TSA) and Lateral Surface Area.

Total Surface Area is the sum of the areas of the faces of a 3 dimensional figure. So like if you want to paint your house including all the walls, the roof, and under the house (Why you want to do this I don't know what's wrong with you?) you would need to find the total surface area before you went to the paint store... Check out this example...

Step 1. Draw out and label all the faces.

TSA=

| $24cm^2$ L face | 6cm + | $24cm^2$ R Face | 6cm + | $48cm^2$ Front | 6cm + |

4cm   4cm   8cm

| $48cm^2$ Back | 6cm + | $32cm^2$ Top | 4cm + |

8cm   8cm

Step 2. Find the area of each face.

| $32cm^2$ bottom |
4cm

8cm
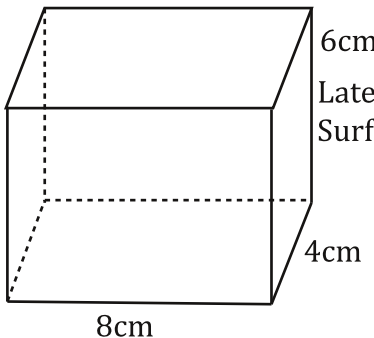
Step 3. Add up the areas of the faces.
$=24cm^2 + 24cm^2 + 48cm^2 + 48cm^2 + 32cm^2 + 32cm^2 = 208cm^2 =$ TSA

Okay, so there are some things that you can assume. First, anything that looks like a rectangle is a rectangle unless it says otherwise. If you don't, the figures will be so overwhelmed with 90° boxes and dimension labels that you couldn't tell what was going on. Also, you can assume that the top and bottom of prisms are congruent unless marked otherwise (rare).

Lateral Surface Area is the total surface area except for the top and bottom. So, if you are more normal and want to paint just the walls outside your house (recommended) you would just need the lateral surface area. By the way, lateral means "side" or "to the side". Like a lateral in football, you throw the ball to the side. Here is an example...

Step 1. Draw out and label all the faces.

6cm

Lateral Surface Area=

| $24cm^2$ L. Face | 6cm + | $24cm^2$ R. Face | 6cm+ | $48cm^2$ Front | 6cm + |

4cm   4cm   8cm

Step 3. Add up the areas of the faces.
$=24cm^2 + 24cm^2 + 48cm^2 + 48cm^2 =$

| $48cm^2$ Back |
6cm

Lateral Surface Area= $144cm^2$

Step 2. Find the area of each face.

8cm

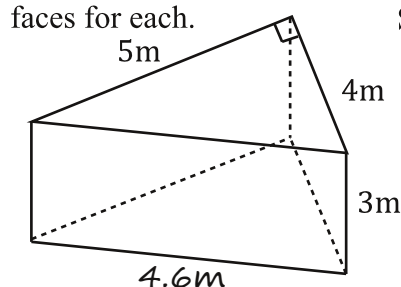Notice the top and bottom are missing. This is Lateral Surface Area.

Now let's do a Cylinder.... to find the "sides" of the cylinder you need to multiply the circumference by the height giving you πdh (or 2πrh).

7cm ⌀5cm

5cm   +   5cm   +   7cm 5cm

πr2   +   πr2   +   2πrh

$$\pi 5^2 + \pi 5^2 + 2\pi(5)(7)$$

$$25\pi + 25\pi + 70\pi = 120\pi \approx$$
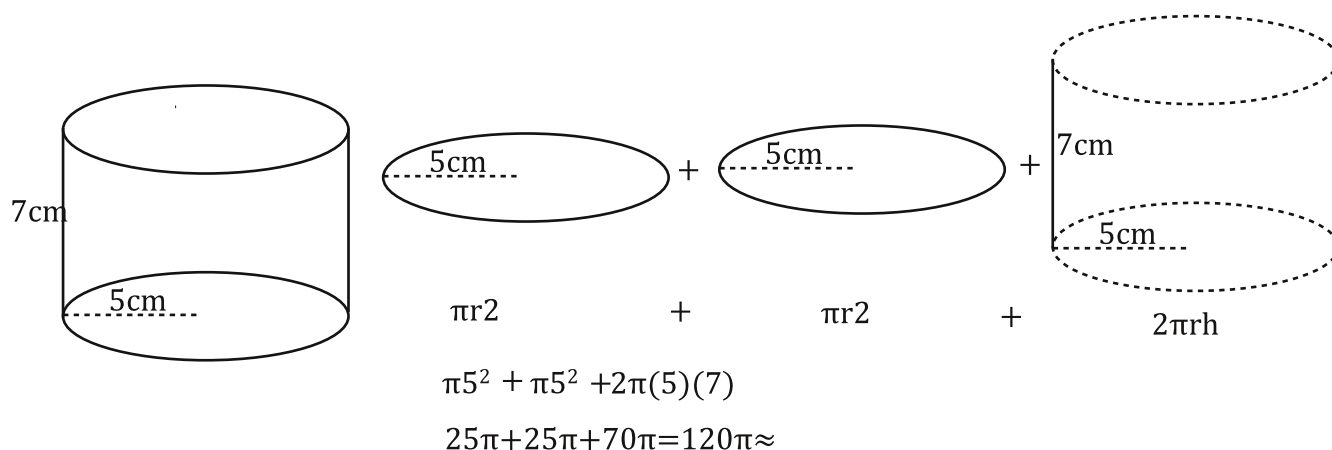
Despite the need to find and add multiple areas, finding surface areas is actually very easy...however a lot of people have trouble getting these consistently correct. Why? Two reasons... One, they have trouble finding missing dimensions... And two, they will often forget a face or two. So, before we get to actually calculating the TSA and Lateral Surface Area we will practice finding dimensions and drawing out all the faces. Look at these examples of how....

Find the missing dimesions and draw a picture of all the faces for each.   Step1. Find the missing dimensions.

Step 2. Draw a picture of each face.

5m 4m 3m 4.6m

$$a^2 + b^2 = c^2$$
$$5^2 + 4^2 = c^2$$
$$25 + 16 = c^2$$
$$\sqrt{41} = \sqrt{c^2}$$
$$6.4 = c$$

5m 4m 3m

5m 4m 3m 5m

5m 4m 3m 4m

3m 4.6m

10cm 15cm 8cm 5cm 6cm 10cm 4cm
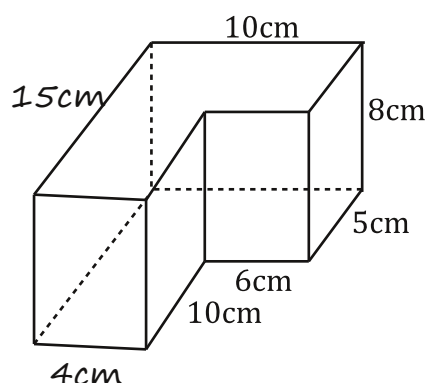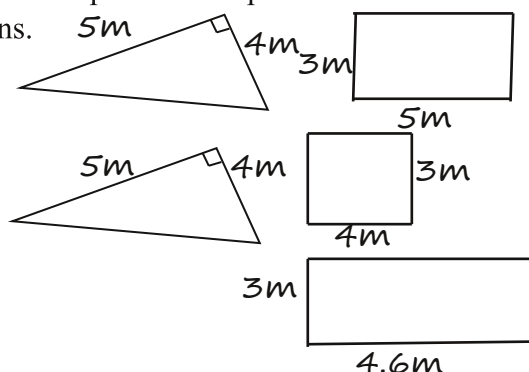
10cm − 6cm = 4cm

10cm + 5cm = 15cm

6cm 4cm 15cm 6cm 4cm 15cm

4cm 4cm

15cm 8cm 6cm 8cm

10cm 8cm 10cm 8cm

5cm 8cm 4cm 8cm

9.54in 10in 6in 6in 3in

$$a^2 + b^2 = c^2$$
$$h^2 + 3^2 = 100^2$$
$$h^2 + 9 = 100$$
$$-9 \qquad -9$$
$$\sqrt{h^2} = \sqrt{91}$$
$$h = 9.54$$

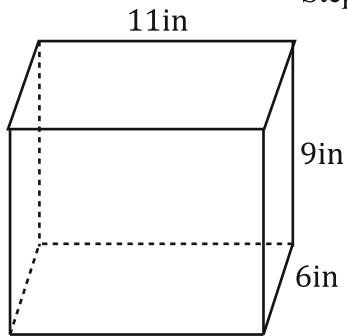9.54in 6in 9.54in 6in 9.54in 6in 9.54in 6in

6in 6in
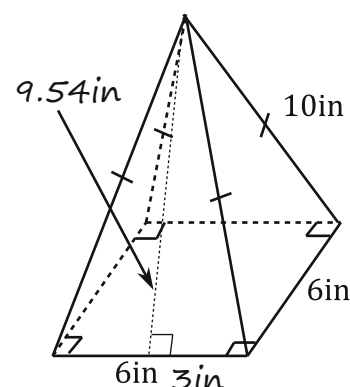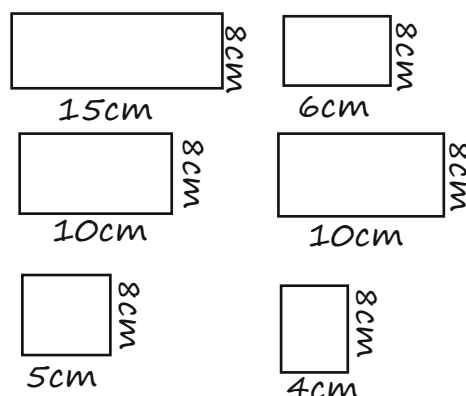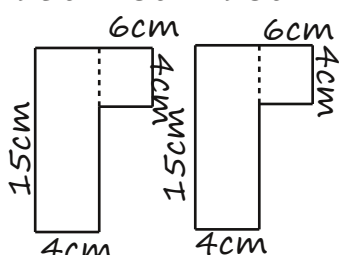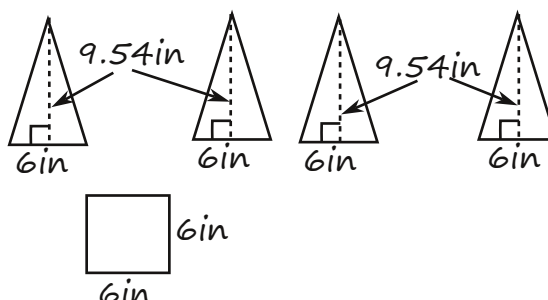
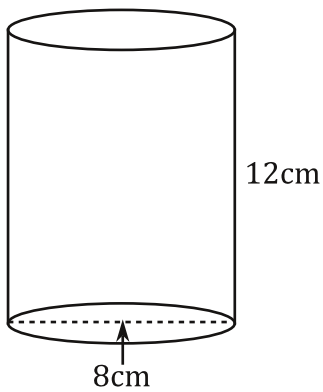Let's practice just this. Once you get it down these problems will be easy!

Find the missing dimensions and draw a picture of all the
faces for each.

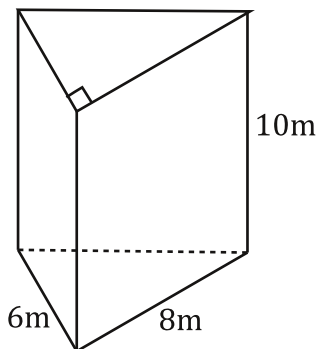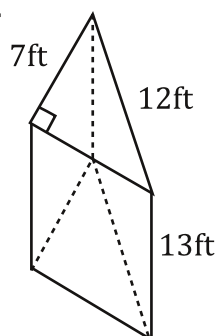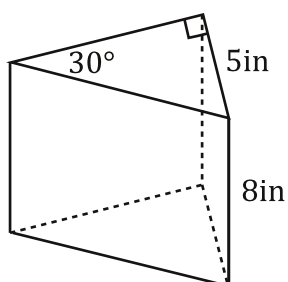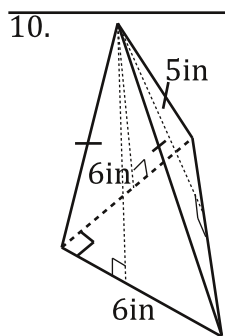Step 1. Find missing dimensions.   Step 2. Draw and label all faces.

1.
11in
9in
6in
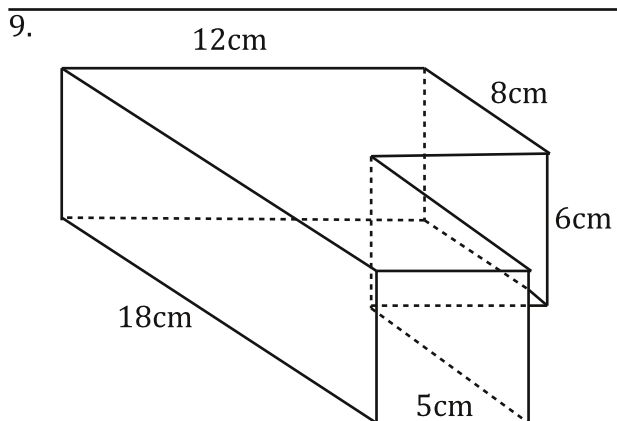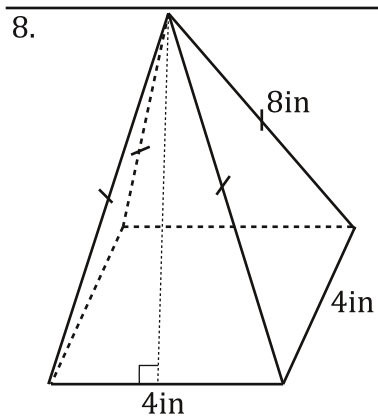
2.
12cm
8cm

3.
10m
6m   8m

4.
7ft
12ft
13ft

5.
30°   5in
8in

6.

4cm

4cm
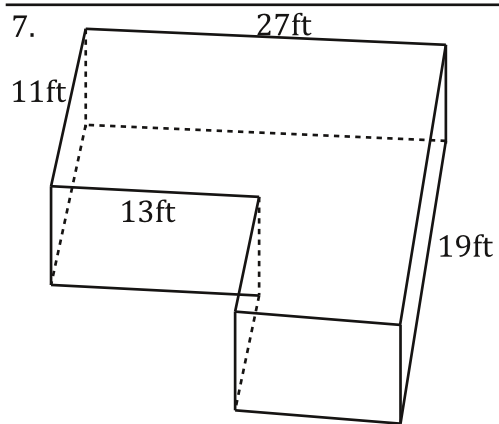
8cm
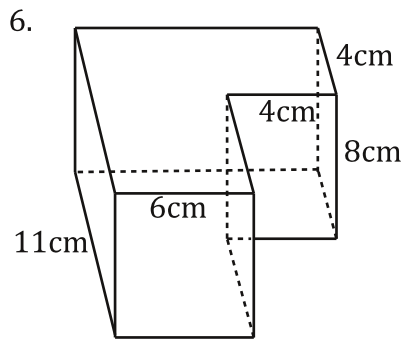
6cm
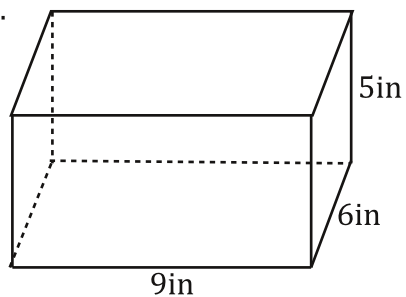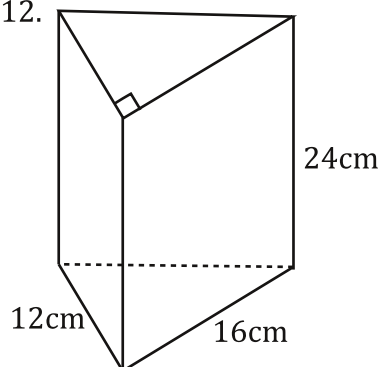
11cm

7.

27ft

11ft

13ft

19ft

8.

8in

4in

4in

9.

12cm

8cm

6cm

18cm

5cm

10.

5in

6in

6in

Find the TSA for each...

11.

5in
6in
9in

12.

24cm

12cm   16cm

13.

15ft

5ft

14.

16ft

8ft

8ft
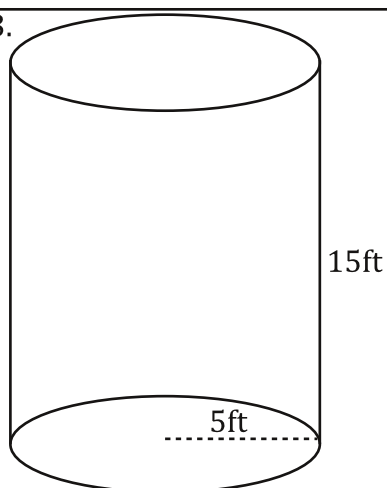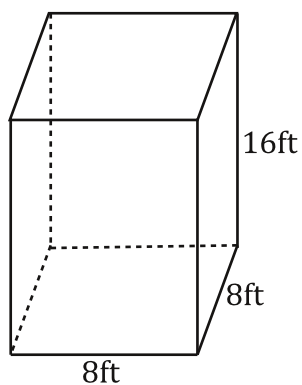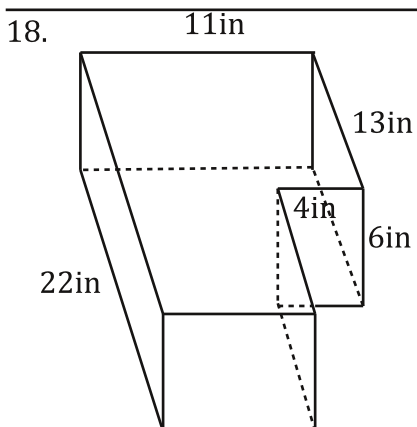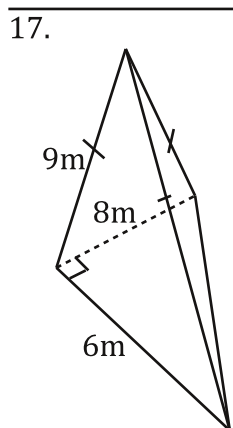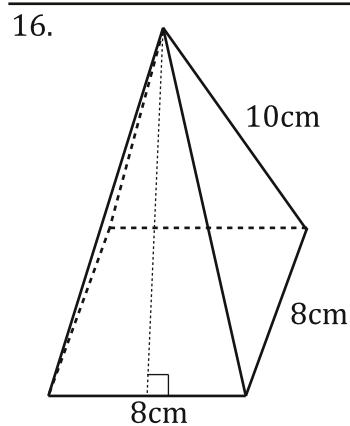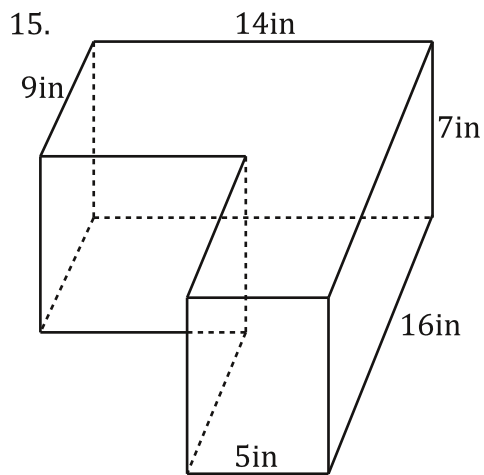
Bubble all the correct answers from above. Don't bubble incorrect answers.

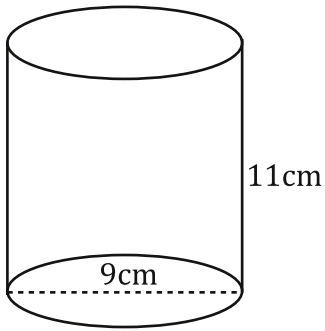○1099.56 ○1344   ○ 628.32 ○9216   ○640   ○ 285   ○258   ○512   ○1199.18 ○567

15.

14in
9in
7in
16in
5in

16.

10cm
8cm
8cm

17.

9m
8m
6m

18.

11in
13in
4in
6in
22in
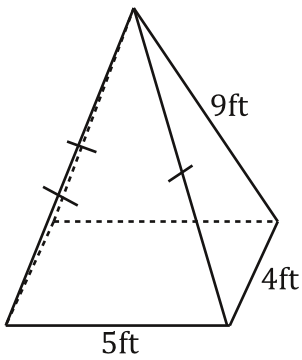
Bubble all the correct answers from above. Don't bubble incorrect answers.

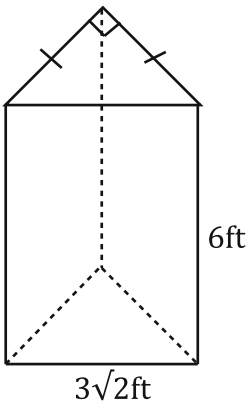○ 707   ○ 49.38   ○ 210.72   ○ 216   ○ 742   ○ 640   ○ 808   ○ 100.68   ○ 123.5   ○ 119.11
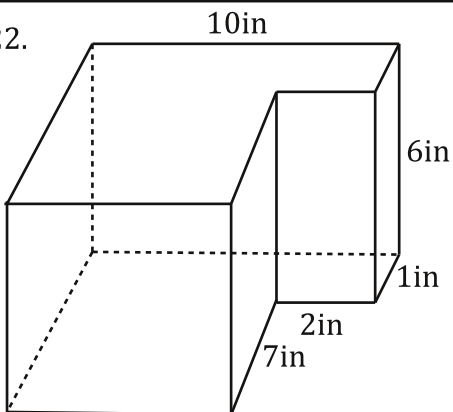
© 2010   www.letspracticegeometry.com

19.

11cm

9cm

20.

9ft

4ft

5ft

21.

6ft

3√2ft

22.

10in

6in

1in

2in

7in
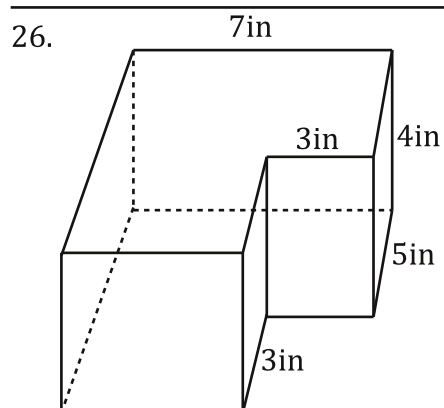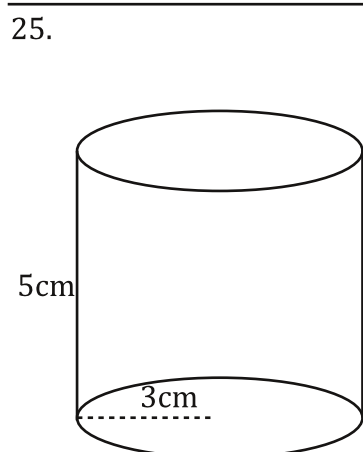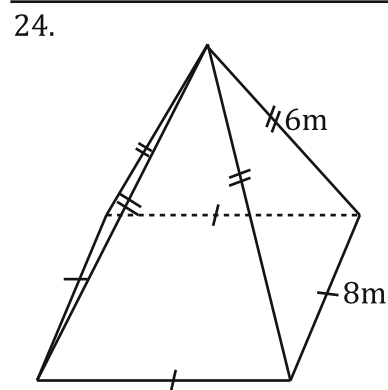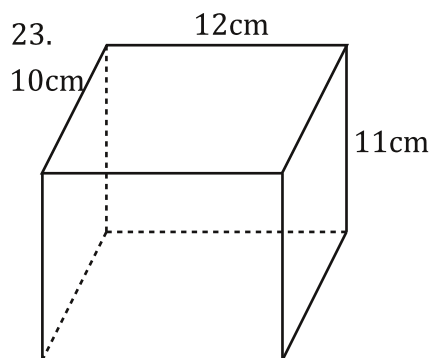
Bubble all the correct answers from above. Don't bubble incorrect answers.

○ 438.26   ○ 348   ○ 79.46   ○ 84.48   ○ 463   ○ 265   ○ 70.46   ○ 76.59   ○ 483.87   ○ 98.34

Find the lateral surface area of each.

23.

12cm

10cm

11cm

24.

6m

8m

25.

5cm

3cm

26.

7in

3in   4in

5in

3in

Bubble all the correct answers from above. Don't bubble incorrect answers.

○ 208   ○ 150.8   ○ 94.25   ○ 135.52   ○ 71.52   ○ 265.64   ○ 49.25   ○ 802   ○ 120   ○ 484