Grade 7 Geometry Workbook

7 lessons · printable · answer key at the back

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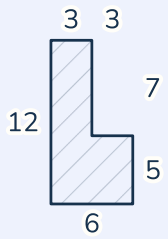
Name _____ Date _____

Contents

1-1

Area of Composite Shapes

WORKED EXAMPLE

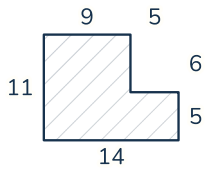


51 cm²

1. Area of composite figures

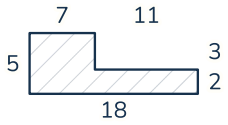
Find the area of each figure. All lengths are in centimeters.

1



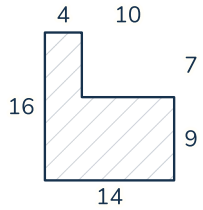
_____ cm²

2



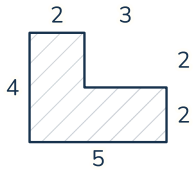
_____ cm²

3



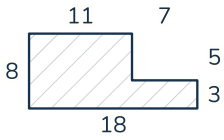
_____ cm²

4



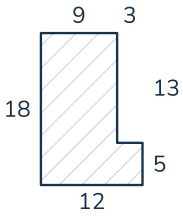
_____ cm²

5



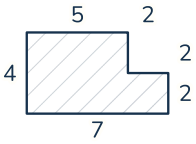
_____ cm²

6



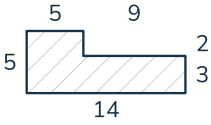
_____ cm²

7



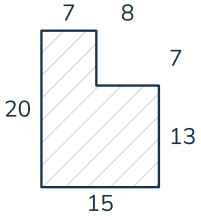
_____ cm²

8



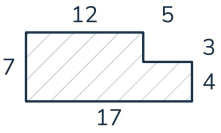
_____ cm²

9



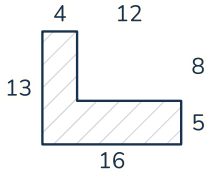
_____ cm²

10



_____ cm²

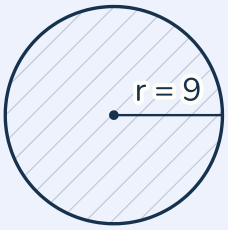
11



_____ cm²

Area of a Circle

WORKED EXAMPLE

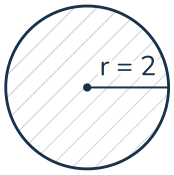


254.34 cm²

2. Area of a circle

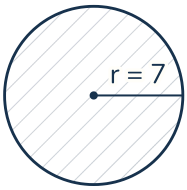
Find the area of each circle. Use π = 3.14.

1



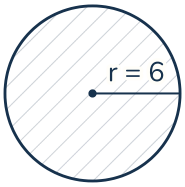
_____ cm²

2



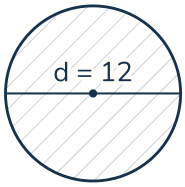
_____ cm²

3



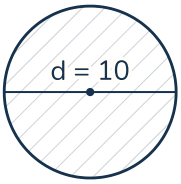
_____ cm²

4



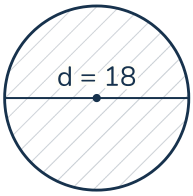
_____ cm²

5



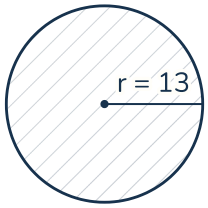
_____ cm²

6



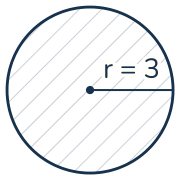
_____ cm²

7



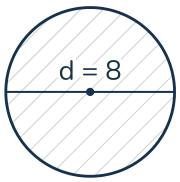
_____ cm²

8



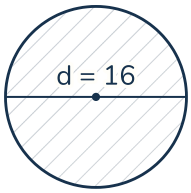
_____ cm²

9



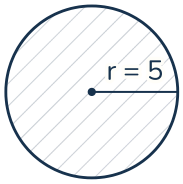
_____ cm²

10



_____ cm²

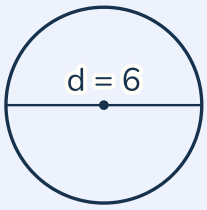
11



_____ cm²

Circumference

WORKED EXAMPLE

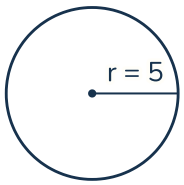


18.84 cm

3. Circumference of a circle

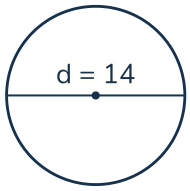
Find the circumference of each circle. Use π = 3.14.

1



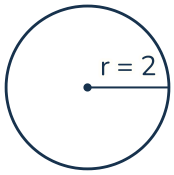
_____ cm

2



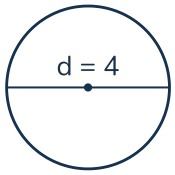
_____ cm

3



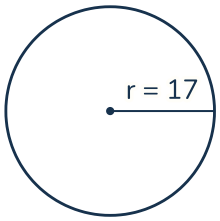
_____ cm

4



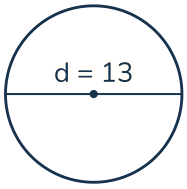
_____ cm

5



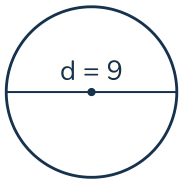
_____ cm

6



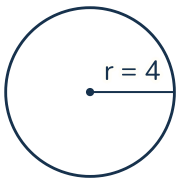
_____ cm

7



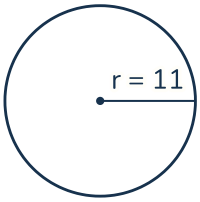
_____ cm

8



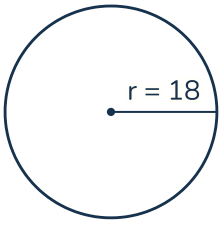
_____ cm

9



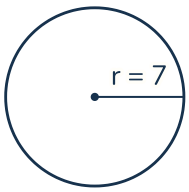
_____ cm

10



_____ cm

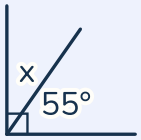
11



_____ cm

Angle Pairs

WORKED EXAMPLE



35 degrees

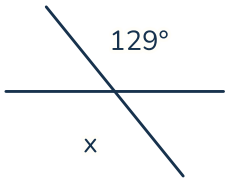
4. Missing angles in a pair

Find the angle marked x. Give each answer in degrees.

1

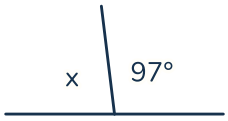
_____ degrees

2



_____ degrees

3

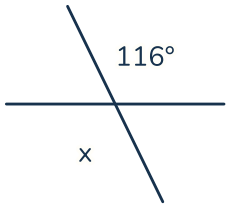


_____ degrees

4

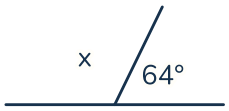
_____ degrees

5



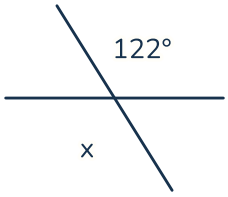
_____ degrees

6



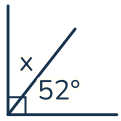
_____ degrees

7



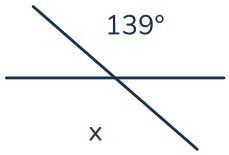
_____ degrees

8



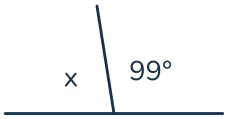
_____ degrees

9



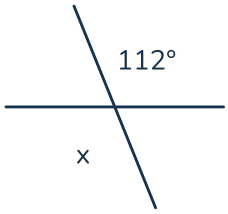
_____ degrees

10



_____ degrees

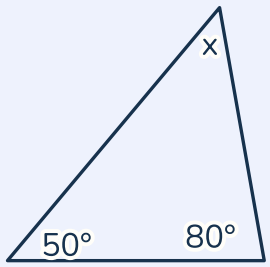
11



_____ degrees

Angles in a Triangle

WORKED EXAMPLE

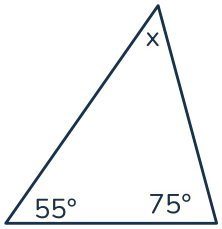


50 degrees

5. The third angle of a triangle

Find the angle marked x. Give each answer in degrees.

1

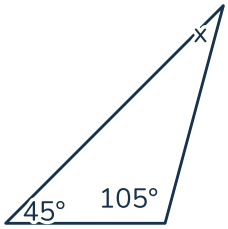


_____ degrees

2

_____ degrees

3

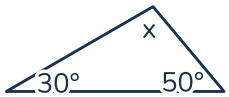


_____ degrees

4

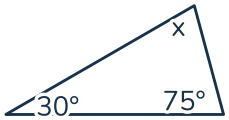
_____ degrees

5



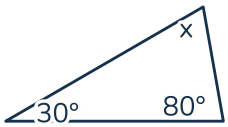
_____ degrees

6



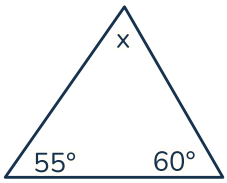
_____ degrees

7



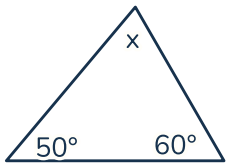
_____ degrees

8



_____ degrees

9

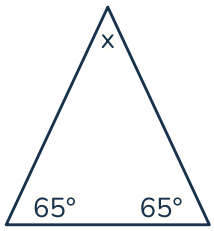


_____ degrees

10

_____ degrees

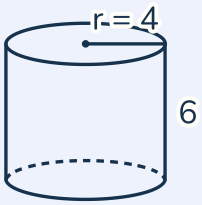
11



_____ degrees

Volume of Cylinders

WORKED EXAMPLE

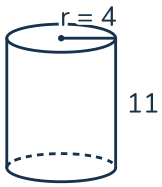


301.44

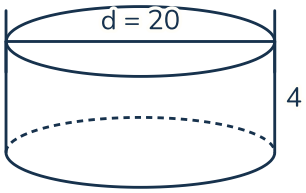
6. Volume of a cylinder

Find the volume of each cylinder. Use π = 3.14.

1



2



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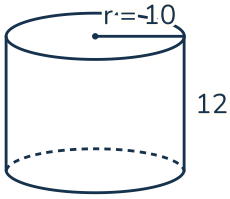

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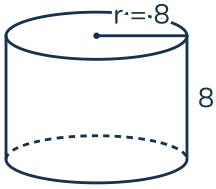

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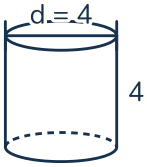

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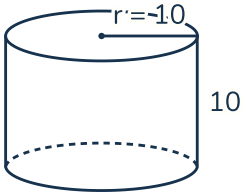

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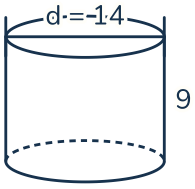
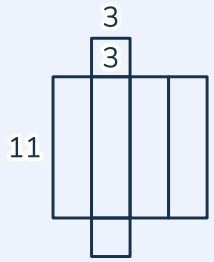


Surface Area

WORKED EXAMPLE

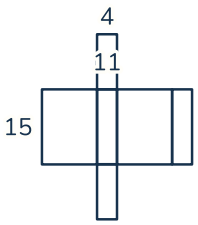


150 cm²

7. Surface area of a box

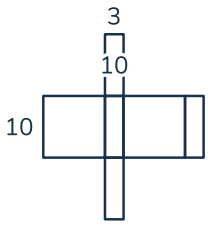
Find the surface area of each box. All lengths are in centimeters.

1



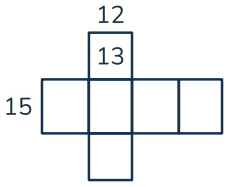
_____ cm²

2



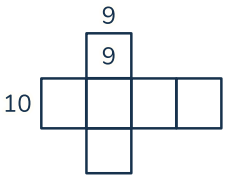
_____ cm²

3



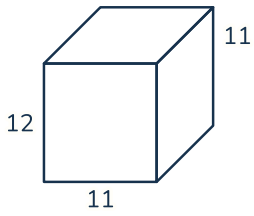
_____ cm²

4



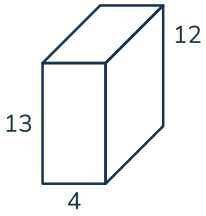
_____ cm²

5



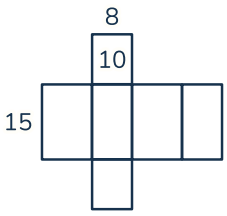
_____ cm²

6



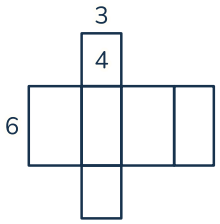
_____ cm²

7



_____ cm²

8



_____ cm²

Answer Key

Area of Composite Shapes

Area of composite figures

1. 14×11 less 5×6: 124 cm²
2. 18×5 less 11×3: 57 cm²
3. 14×16 less 10×7: 154 cm²
4. 5×4 less 3×2: 14 cm²
5. 18×8 less 7×5: 109 cm²
6. 12×18 less 3×13: 177 cm²
7. 7×4 less 2×2: 24 cm²
8. 14×5 less 9×2: 52 cm²
9. 15×20 less 8×7: 244 cm²
10. 17×7 less 5×3: 104 cm²
11. 16×13 less 12×8: 112 cm²

Area of a Circle

Area of a circle

1. r = 2: 12.56 cm²
2. r = 7: 153.86 cm²
3. r = 6: 113.04 cm²
4. d = 12: 113.04 cm²
5. d = 10: 78.5 cm²
6. d = 18: 254.34 cm²
7. r = 13: 530.66 cm²
8. r = 3: 28.26 cm²
9. d = 8: 50.24 cm²
10. d = 16: 200.96 cm²
11. r = 5: 78.5 cm²

Circumference

Circumference of a circle

1. r = 5: 31.4 cm
2. d = 14: 43.96 cm
3. r = 2: 12.56 cm
4. d = 4: 12.56 cm
5. r = 17: 106.76 cm
6. d = 13: 40.82 cm
7. d = 9: 28.26 cm
8. r = 4: 25.12 cm
9. r = 11: 69.08 cm
10. r = 18: 113.04 cm
11. r = 7: 43.96 cm

Angle Pairs

Missing angles in a pair

1. supplementary, 83°: 97°
2. vertical, 129°: 129°
3. supplementary, 97°: 83°

Angle Pairs (continued)

Missing angles in a pair (continued)

4. supplementary, 75°: 105°
5. vertical, 116°: 116°
6. supplementary, 64°: 116°
7. vertical, 122°: 122°
8. complementary, 52°: 38°
9. vertical, 139°: 139°
10. supplementary, 99°: 81°
11. vertical, 112°: 112°

Angles in a Triangle

The third angle of a triangle

1. 55° + 75° = 130°: 50°
2. 25° + 60° = 85°: 95°
3. 45° + 105° = 150°: 30°
4. 75° + 80° = 155°: 25°
5. 30° + 50° = 80°: 100°
6. 30° + 75° = 105°: 75°
7. 30° + 80° = 110°: 70°
8. 55° + 60° = 115°: 65°
9. 50° + 60° = 110°: 70°
10. 25° + 50° = 75°: 105°
11. 65° + 65° = 130°: 50°

Volume of Cylinders

Volume of a cylinder

1. r = 4, h = 11: 552.64 cm³
2. d = 20, h = 4: 1256 cm³
3. r = 10, h = 12: 3768 cm³
4. r = 8, h = 8: 1607.68 cm³
5. d = 4, h = 4: 50.24 cm³
6. r = 10, h = 10: 3140 cm³
7. d = 14, h = 9: 1384.74 cm³

Surface Area

Surface area of a box

1. 4×11×15 → 2(44 + 60 + 165): 538 cm²
2. 3×10×10 → 2(30 + 30 + 100): 320 cm²
3. 12×13×15 → 2(156 + 180 + 195): 1062 cm²
4. 9×9×10 → 2(81 + 90 + 90): 522 cm²
5. 11×11×12 → 2(121 + 132 + 132): 770 cm²
6. 4×12×13 → 2(48 + 52 + 156): 512 cm²
7. 8×10×15 → 2(80 + 120 + 150): 700 cm²
8. 3×4×6 → 2(12 + 18 + 24): 108 cm²

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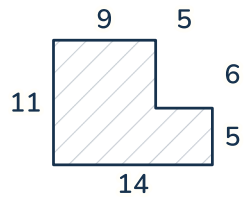
Solutions (1 of 7)

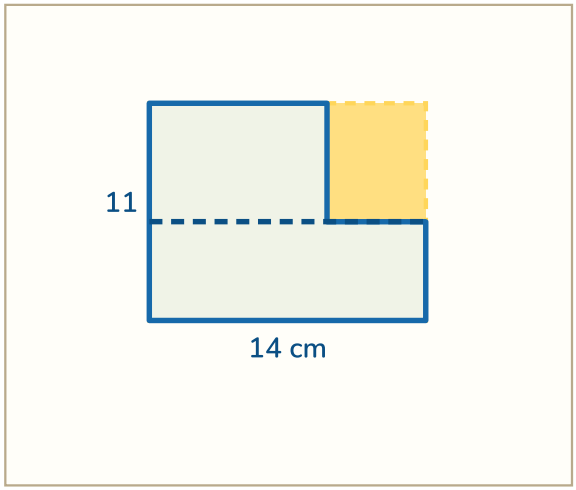
Area of Composite Shapes

Area of composite figures

1.



____ cm²



First way: pretend the bite was never taken. The whole rectangle would be 14 × 11 = 154.

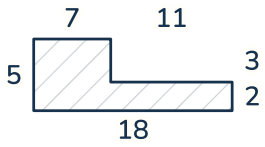
Then take the bite off. It is 5 × 6 = 30, so the L is 154 − 30 = 124 square cm.

Second way, and it works on any of these: cut the L into two rectangles.

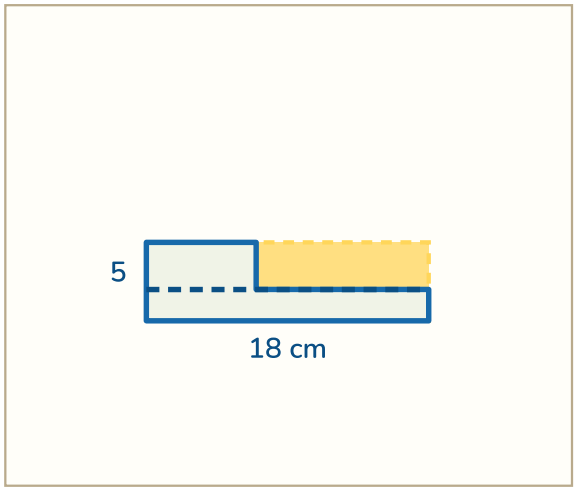
The bottom strip is 14 × 5 = 70, and the piece standing on it is 9 × 6 = 54.

70 + 54 = 124 square cm — the same answer as the first way. Two methods that agree is how you know the answer is right.

2.



____ cm²



First way: pretend the bite was never taken. The whole rectangle would be 18 × 5 = 90.

Then take the bite off. It is 11 × 3 = 33, so the L is 90 − 33 = 57 square cm.

Second way, and it works on any of these: cut the L into two rectangles.

The bottom strip is 18 × 2 = 36, and the piece standing on it is 7 × 3 = 21.

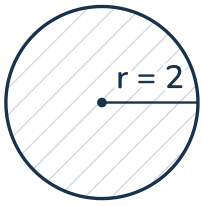
36 + 21 = 57 square cm — the same answer as the first way. Two methods that agree is how you know the answer is right.

Solutions (2 of 7)

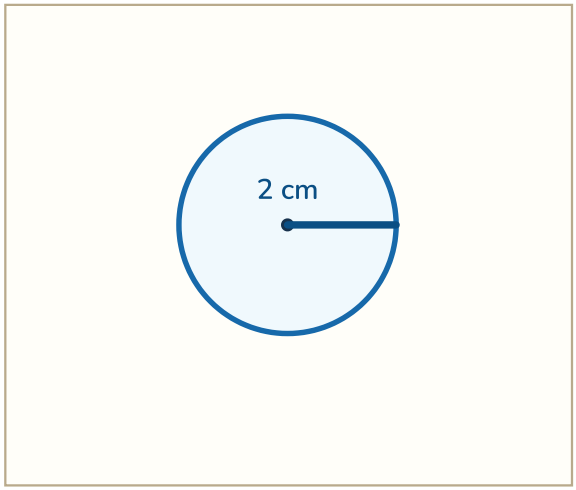
Area of a Circle

Area of a circle

1.



_____ cm²

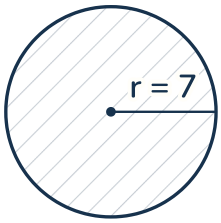


The 2 cm marked here runs from the center to the edge — that is the radius, which is what both formulas want.

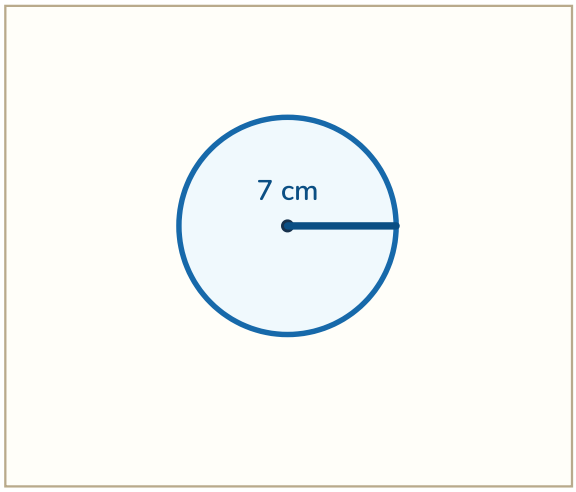
Area is π × r × r. Square the RADIUS first — only the r is squared, not the π with it: 2 × 2 = 4.

Then multiply by π: 4 × 3.14 = 12.56 square cm.

2.



_____ cm²



The 7 cm marked here runs from the center to the edge — that is the radius, which is what both formulas want.

Area is π × r × r. Square the RADIUS first — only the r is squared, not the π with it: 7 × 7 = 49.

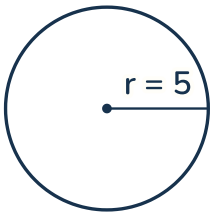
Then multiply by π: 49 × 3.14 = 153.86 square cm.

Solutions (3 of 7)

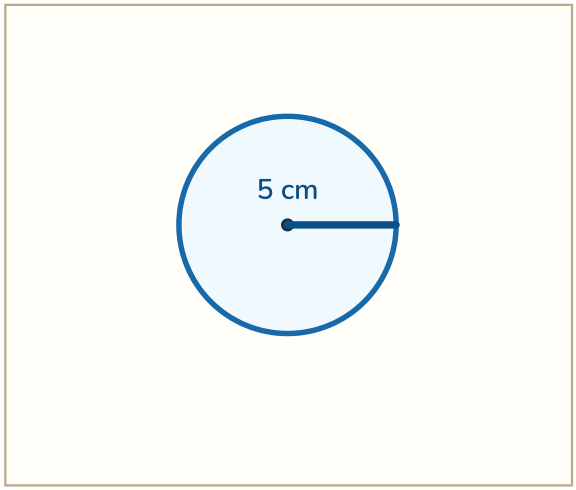
Circumference

Circumference of a circle

1.



_____ cm

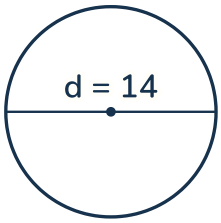


The 5 cm marked here runs from the center to the edge — that is the radius, which is what both formulas want.

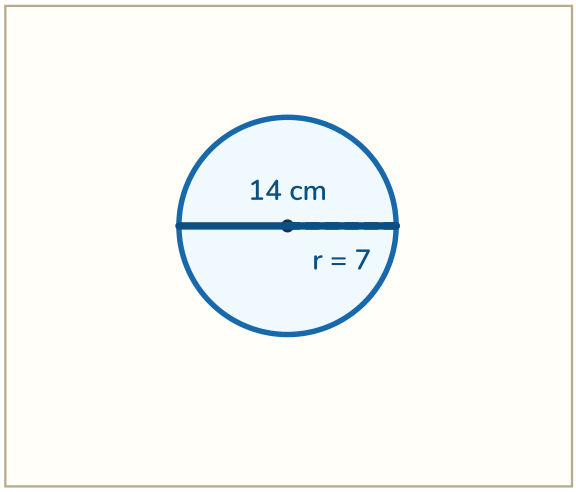
Circumference is π × the whole way across, and the whole way across is two radiuses: 2 × 5 = 10.

Then multiply by π: 10 × 3.14 = 31.4 cm. Slightly more than three times across — which is what π has always been.

2.



_____ cm



The 14 cm marked here goes right ACROSS the circle — it is the diameter, the whole way across, which is exactly what a circumference needs.

Circumference is π × the whole way across — that is the diameter, 14.

Then multiply by π: 14 × 3.14 = 43.96 cm. Slightly more than three times across — which is what π has always been.

Solutions (4 of 7)

Angle Pairs

Missing angles in a pair

1.

___ degrees

83° + x = **180°**

180 − 83 = **97°**

83° + 97° = **180°**

from the picture, not the numbers

lines crossing:

x = the angle opposite

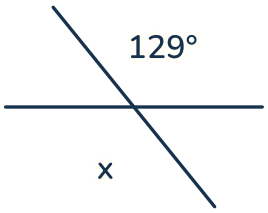
The two angles sit on a STRAIGHT LINE. A straight line is a half turn, which is 180 — not 90, and the picture is the only thing that tells you which.

So the two must add to 180: x = 180 − 83 = 97°.

If it had been the other kind you would have taken it from 90 instead and been 90° out — which is why the picture is read first.

One more shape to know: where two straight lines CROSS, the two angles facing each other are equal — nothing is taken away at all. Subtracting there would be wrong.

2.



___ degrees

129° and x

opposite = **equal**

129° → **129°**

Two straight lines crossing. This is the pair that is NOT a subtraction — nothing adds to 90 or 180 here, so reaching for either is the mistake.

Angles opposite each other at a crossing are EQUAL. Each one is what is left when the same straight line is taken away from the same straight line, so they cannot differ.

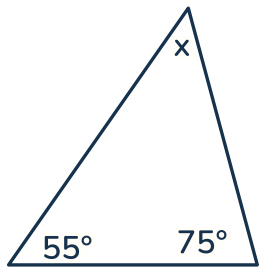
So x is 129° — the same as the one across from it, not 180 minus it.

Solutions (5 of 7)

Angles in a Triangle

The third angle of a triangle

1.



___ degrees

$55 + 75 = 130$

$180 - 130 = \mathbf{50°}$

Every triangle's three angles add to 180 — and that is not a number to take on trust. Tear the three corners off any triangle you like and they fit together into a straight line, every time.

Two of them are given: 55 and 75, which is 130 between them.

So the third takes up what is left of the 180: 180 – 130 = 50°.

2.

___ degrees

$25 + 60 = 85$

$180 - 85 = \mathbf{95°}$

Every triangle's three angles add to 180 — and that is not a number to take on trust. Tear the three corners off any triangle you like and they fit together into a straight line, every time.

Two of them are given: 25 and 60, which is 85 between them.

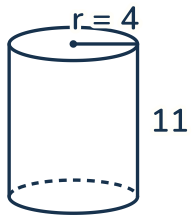
So the third takes up what is left of the 180: 180 – 85 = 95°.

Solutions (6 of 7)

Volume of Cylinders

Volume of a cylinder

1.



base: 50.24

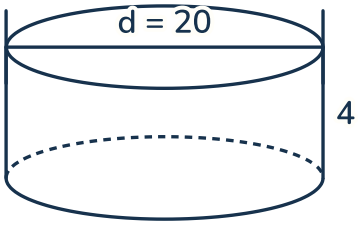
50.24 × 11 = **552.64**

Same idea as a box: the area of the base times how tall it is. Here the base is a circle, and that is the only difference.

The circle's area is π × r × r = 3.14 × 4 × 4 = 50.24 square cm.

Times the height: 50.24 × 11 = 552.64 cubic cm.

2.



base: 314

314 × 4 = **1256**

The 20 cm goes right across, so it is the diameter. Halve it first: the radius is 10. Every one of these formulas SQUARES the radius, so getting this wrong is out by a factor of four, not two.

Same idea as a box: the area of the base times how tall it is. Here the base is a circle, and that is the only difference.

The circle's area is π × r × r = 3.14 × 10 × 10 = 314 square cm.

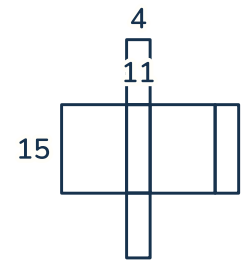
Times the height: 314 × 4 = 1256 cubic cm.

Solutions (7 of 7)

Surface Area

Surface area of a box

1.



____ cm²

front and back:	2 × 4 × 15 =	120
the two sides:	2 × 11 × 15 =	330
top and bottom:	2 × 4 × 11 =	88
total:		**538**

A net lays all six faces out flat, so none of them is hidden — which is the whole reason a net is easier than the solid. They still come in three PAIRS.

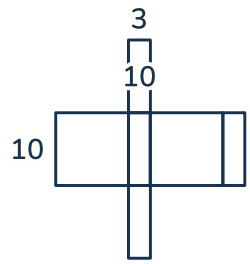
Front and back are 4 by 15, and they are identical — so that pair is 2 × 4 × 15 = 120.

The two sides are 11 by 15, and they are identical — so that pair is 2 × 11 × 15 = 330.

Top and bottom are 4 by 11, and they are identical — so that pair is 2 × 4 × 11 = 88.

Three pairs, six faces, none missed: 120 + 330 + 88 = 538 square cm.

2.



____ cm²

front and back:	2 × 3 × 10 =	60
the two sides:	2 × 10 × 10 =	200
top and bottom:	2 × 3 × 10 =	60
total:		**320**

A net lays all six faces out flat, so none of them is hidden — which is the whole reason a net is easier than the solid. They still come in three PAIRS.

Front and back are 3 by 10, and they are identical — so that pair is 2 × 3 × 10 = 60.

The two sides are 10 by 10, and they are identical — so that pair is 2 × 10 × 10 = 200.

Top and bottom are 3 by 10, and they are identical — so that pair is 2 × 3 × 10 = 60.

Three pairs, six faces, none missed: 60 + 200 + 60 = 320 square cm.