

GRADE 7

Empire State

Mathematics

March to March



**Sample
Lesson**

Continental Press

Table of Contents

Introduction	5
UNIT 1 Number Systems and Theory	7
7.N.1, 2, 3, 17 Lesson 1 Real Numbers	8
7.N.14 Lesson 2 Exponents	12
7.N.5, 6, 7 Lesson 3 Scientific Notation	16
7.N.8, 9 Lesson 4 Factors and Multiples	20
7.N.10 Lesson 5 Prime Factorization	24
Number Systems and Theory Review	28
UNIT 2 Operations	31
7.N.12, 13 Lesson 1 Operations with Integers	32
7.N.4 Lesson 2 Laws of Exponents	36
7.N.11 Lesson 3 Order of Operations	40
7.N.15, 16, 18 Lesson 4 Square Roots	44
7.N.19 Lesson 5 Estimation	48
Operations Review	52
UNIT 3 Algebra	55
6.A.2; 7.A.1 Lesson 1 Algebraic Expressions	56
6.A.3 Lesson 2 Writing Equations	60
6.A.4 Lesson 3 Solving Equations	64
7.A.5; 7.G.10 Lesson 4 Solving Inequalities	68
6.A.5 Lesson 5 Solving Proportions	72
7.A.6 Lesson 6 Evaluating Formulas	76
Algebra Review	80
UNIT 4 Geometry	83
7.G.1 Lesson 1 Circles	84
7.G.3 Lesson 2 Three-Dimensional Shapes	88
7.G.2 Lesson 3 Volume	92
7.A.6; 7.G.4 Lesson 4 Surface Area	96
7.G.7 Lesson 5 Missing Angles	100
6.G.10, 11 Lesson 6 Coordinate Geometry	104
Geometry Review	108

UNIT 5 Measurement		111
7.M.2	Lesson 1 Relationship of Volume and Capacity	112
7.M.3, 4, 9	Lesson 2 Weight and Mass	116
7.M.11	Lesson 3 Estimating Surface Area	120
7.M.12, 13	Lesson 4 Estimating Weight and Mass	124
7.M.10	Lesson 5 Relative Error	128
	Measurement Review	132
UNIT 6 Statistics, Part 1		135
6.S.1, 2; 7.S.1, 9	Lesson 1 Sampling and Recording Data	136
7.S.4, 5	Lesson 2 Statistics	140
7.S.6	Lesson 3 Circle Graphs	144
7.S.2	Lesson 4 Creating Circle Graphs	148
	Statistics, Part 1 Review	152
UNIT 7 Statistics, Part 2		155
6.S.4	Lesson 1 Choosing Appropriate Graphs	156
7.S.6	Lesson 2 Interpreting Graphs	160
7.S.3, 6	Lesson 3 Creating Bar Graphs and Line Graphs	164
7.S.7	Lesson 4 Misleading Statistics and Graphs	168
6.S.3	Lesson 5 Venn Diagrams	172
	Statistics, Part 2 Review	176
UNIT 8 Probability		179
6.S.9, 11	Lesson 1 Compound Events	180
6.S.10	Lesson 2 Dependent Events	184
7.S.8, 10	Lesson 3 Experimental Probability	188
7.S.11, 12	Lesson 4 Testing Predictions	192
	Probability Review	196

Surface Area

Indicators 7.A.6; 7.G.4

surface area

rectangular prism

cube

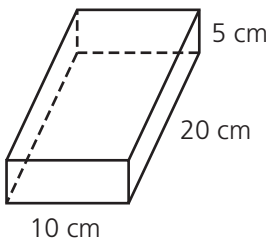
cylinder



The **surface area** of any solid figure is a measure of the total area of its outer surfaces. Formulas are used to find the surface area of different solid figures.

The formula for the surface area of a **rectangular prism** is $SA = 2lw + 2lh + 2wh$.

What is the surface area of this rectangular prism?



1. Substitute the measures for each dimension into the surface area formula for a prism: $SA = 2(10)(20) + 2(10)(5) + 2(20)(5)$.
2. Simplify using the correct order of operations: $SA = 2(10)(20) + 2(10)(5) + 2(20)(5) = 400 + 100 + 200 = 700$.

The surface area of the rectangular prism is 700 cm^2 .



The surface area of a **cube** with a side length s is given by the formula $SA = 6s^2$.



Some important area formulas:

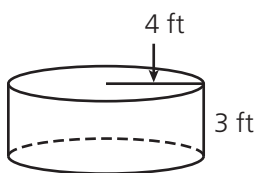
Rectangle: $A = lw$

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

Circle: $A = \pi r^2$

The formula for the surface area of a **cylinder** is $SA = 2\pi r^2 + 2\pi rh$.

What is the surface area of this cylinder?



1. Substitute the measures for the radius and the height into the surface area formula for a cylinder: $SA = 2\pi(4)^2 + 2\pi(4)(3)$.
2. Simplify using the correct order of operations: $SA = 2\pi(4)^2 + 2\pi(4)(3) = 32\pi + 24\pi = 56\pi$.

The surface area is $56\pi \text{ ft}^2$.



The surface area of a cylinder equals the area of both circular bases plus the area of the curved surface.



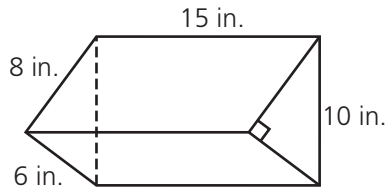
When finding the surface area of a cylinder, you can leave the answer in terms of π or use its approximate value 3.14.



GUIDED PRACTICE

Try this sample multiple-choice problem.

- S What is the surface area of this triangular prism?



- A 338 in.² C 456 in.²
 B 408 in.² D 480 in.²



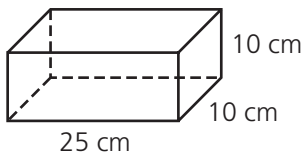
This problem asks you to find the surface area of a triangular prism. The surface area is equal to the sum of the areas of each face. The areas of the two triangular bases are $A = 2 \cdot \frac{1}{2} \cdot 6 \cdot 8 = 48$. The areas of the three rectangular sides are: $A = 6(15) + 8(15) + 10(15) = 90 + 120 + 150 = 360$. Add the areas of the bases and the sides: $48 + 360 = 408$ in.². The correct answer is B.



INDEPENDENT PRACTICE

Read each problem. Circle the letter of the best answer.

- 1 What is the surface area of this box? (Use $SA = 2lw + 2lh + 2wh$.)



- A 600 cm² C 1,200 cm²
 B 700 cm² D 2,500 cm²

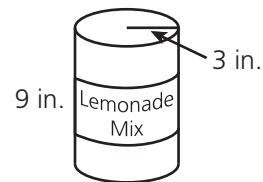
- 2 Each side of a cube is 9 inches long. What is its surface area? (Use $SA = 6s^2$.)

- A 81 in.² C 486 in.²
 B 324 in.² D 729 in.²

- 3 A suitcase is 2.5 feet long, 1.75 feet wide, and 1 foot tall. What is its total surface area? (Use $SA = 2lw + 2lh + 2wh$.)

- A 4.375 ft² C 8.75 ft²
 B 8.625 ft² D 17.25 ft²

- 4 What is the surface area of this container? (Use $SA = 2\pi r^2 + 2\pi rh$.)



- A 66π in.² C 81π in.²
 B 72π in.² D 108π in.²

- 5 A factory uses a covered cylinder for storage. It is 4 meters high and has a radius of 1.5 meters. What is the total surface area, in square meters, of this cylinder? (Use $SA = 2\pi r^2 + 2\pi rh$ and $\pi \approx 3.14$.)

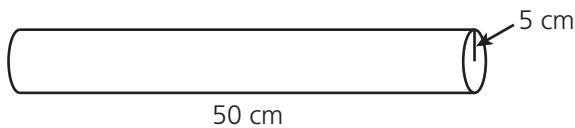
- A 51.81 C 138.16
 B 103.62 D 276.32



GUIDED PRACTICE

Try this sample constructed response problem.

- S** This tube is used to hold a poster.



Part A: What is the area of the circular top of this tube?
(Use $\pi \approx 3.14$.)

Answer: 78.5 cm²

Part B: What is the total surface area of the tube?
(Use $SA = 2\pi r^2 + 2\pi rh$ and $\pi \approx 3.14$.)

Answer: 1,727 cm²



Part A asks you to find the area of the circular top of the tube. The formula for the area of a circle is $A = \pi r^2$, where $\pi = 3.14$ and $r = 5$: $A = 3.14(5)^2 = 78.5$. The correct answer is 78.5 cm^2 . Part B asks you to find the total surface area of the tube. Substitute the values 3.14 for π , 5 for r , and 50 for h into the given formula. Then simplify using the correct order of operations: $SA = 2(3.14)(5)^2 + 2(3.14)(5)(50) = 157 + 1,570 = 1,727$. The correct answer is $1,727 \text{ cm}^2$.



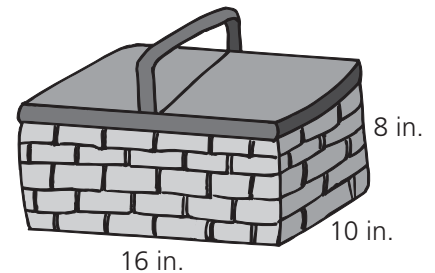
INDEPENDENT PRACTICE

Read the problem. Write your answers.

- 6** This covered picnic basket is in the shape of a rectangular prism.

What is the total surface area of this picnic basket, not including the handles? (Use $SA = 2lw + 2lh + 2wh$.)

Show your work.



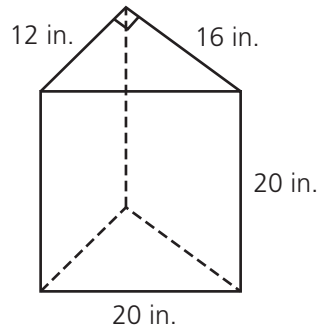
Answer: _____



INDEPENDENT PRACTICE

Read the problem. Write your answers.

- 7 Tyler used wood to make a covered storage unit for his deck. A diagram of the storage unit is shown below.



Part A: What is the area of the top of the unit Tyler made?

Show your work.

Answer: _____

Part B: What is the total surface area of this storage unit?

Show your work.

Answer: _____



The surface area of a solid figure equals the sum of the areas of all the faces.