Unit 1 Review

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Convert 8 yd. to inches.
a. 24 in. b. 288 in. c. 44 in. d. 96 in.

____ 2. Convert 114 in. to yards, feet, and inches.
a. 6 yd. 0 ft. 3 in.
b. 3 yd. 0 ft. 6 in.
c. 1 yd. 1 ft. 18 in.
d. 4 yd. 0 ft. 18 in.

____ 3. Convert 12 250 ft. to miles, yards, and feet.
a. 6 mi. 140 yd. 10 ft.
b. 2 mi. 46 yd. 34 ft.
c. 2 mi. 563 yd. 1 ft.
d. 6 mi. 563 yd. 1 ft.

____ 4. Oscar is building a fence around his rectangular garden. His garden measures 18 ft. 6 in. by 8 ft. 5 in. The fencing material is sold by the yard. It costs $4.05/yd. What is the cost of material before taxes?
a. $71.55 b. $68.85 c. $72.90 d. $36.45

____ 5. Paul plans to replace 436 in. of wood railing along the top of his patio fence. The wood is sold in 8-ft. lengths. How many 8-ft. lengths does Paul need to purchase?
a. 55 b. 6 c. 4 d. 5

____ 6. Which referent could you use for 1 km?
a. The distance equal to $2\frac{1}{2}$ laps on an oval running track
b. The length of an iPod
c. The length of a snowboard
d. The length of your arm span

____ 7. Which referent could you use for 1 yd.?
a. The width of your shortest finger
b. The length of a screwdriver
c. The height of the kitchen counter above the floor
d. The length of a football field

____ 8. Which referent could you use for 1 in.?
a. The distance from where you are now to the nearest restaurant
b. The diameter of a bicycle wheel
c. The length of your calculator
d. The width of your largest toe

____ 9. Which referent could you use for 1 ft.?
a. The distance between Regina and Whitehorse
b. The diameter of a basketball
c. The height of your math teacher
d. The height of an ice hockey net

____ 10. Which SI unit is most appropriate for measuring the distance between your school and the nearest airport?
a. Centimetres b. Metres c. Millimetres d. Kilometres

____ 11. Which SI unit is most appropriate for measuring the diameter of a marble?

a. Metres b. Kilometres c. Millimetres d. Centimetres

____ 12. Which imperial unit is most appropriate for measuring the width of a snowboard?
a. Miles b. Inches c. Feet d. Yards

____ 13. An indoor lacrosse goal is 4 ft. high. What is this measurement to the nearest tenth of a metre?
a. 1.3 m b. 1.2 m c. 13.3 m d. 12.0 m

____ 14. A penalty box on a soccer field measures 44 yd. by 18 yd. What are these dimensions to the nearest tenth of a metre?
a. 39.6 m by 16.2 m
b. 47.7 m by 16.2 m
c. 39.6 m by 17.6 m
d. 47.7 m by 17.6 m

____ 15. On a road map of British Columbia, the distance between Vancouver and Fort St. John is 1237 km. What is this distance to the nearest mile?
a. 742 mi. b. 673 mi. c. 1979 mi. d. 2061 mi.

____ 16. Convert 3200 m to yards and the nearest foot.
a. 1066 yd. 2 ft. b. 2953 yd. 2 ft. c. 3466 yd. 2 ft. d. 820 yd. 2 ft.

____ 17. Convert 1860 yd. to the nearest tenth of a kilometre.
a. 167.4 km b. 1674.0 km c. 1.7 km d. 16.7 km

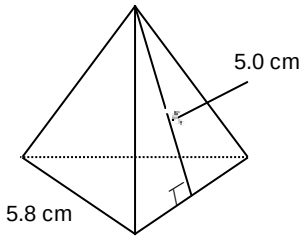
____ 18. Quentin is 5 ft. 9 in. tall. What is his height to the nearest centimetre?
a. 128 cm b. 183 cm c. 173 cm d. 159 cm

____ 19. On a rugby field, the goal is 3 m high at the crossbar. What is this height to the nearest foot?
a. 11 ft. b. 8 ft. c. 10 ft. d. 9 ft.

____ 20. A thin strip of wood laminate is to be glued to the edges of a table. The length of laminate required is equal to the perimeter of the table, which has dimensions 175 cm by 110 cm. The laminate is sold in 8-ft. lengths. How much laminate must be purchased?
a. 24 ft. b. 32 ft. c. 16 ft. d. 8 ft.

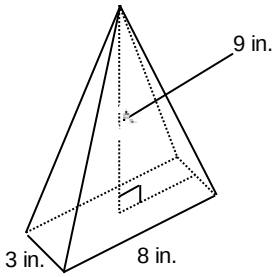
____ 21. The North Saskatchewan River flows eastward from the Rocky Mountains to central Saskatchewan. It is approximately 1287 km long. What is this length to the nearest mile?
a. 2060 mi. b. 830 mi. c. 730 mi. d. 772 mi.

____ 22. Determine the surface area of this regular tetrahedron to the nearest square centimetre.



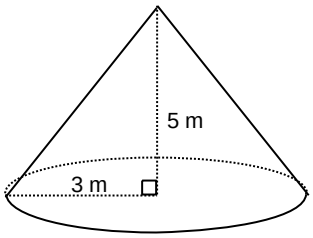
a. 29 cm^2 b. 116 cm^2 c. 58 cm^2 d. 44 cm^2

____ 23. Determine the surface area of this right rectangular pyramid to the nearest square inch.



a. 127 square inches
b. 103 square inches
c. 229 square inches
d. 75 square inches

____ 24. Determine the surface area of this right cone to the nearest square metre.



a. 74 m^2
b. 55 m^2
c. 75 m^2
d. 83 m^2

____ 25. The lateral area of a cone is 150.6 cm^2. The diameter of the cone is 8.0 cm. Determine the height of the cone to the nearest tenth of a centimetre.
a. 9.3 cm
b. 11.3 cm
c. 7.2 cm
d. 12.0 cm

____ 26. The slant height of a right square pyramid is 17 ft. and the side length of the base is 15 ft. Determine its lateral area to the nearest square foot.
a. 510 square feet
b. 458 square feet
c. 1020 square feet
d. 128 square feet

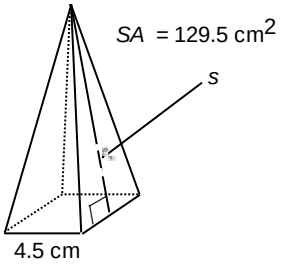
____ 27. A right cone has a height of 18 in. and a base diameter of 6 in. Determine the lateral area of the cone to the nearest square inch.
a. 170 square inches
b. 172 square inches
c. 200 square inches
d. 179 square inches

____ 28. A right pyramid has a square base with side length 12 m and a height of 3 m. Calculate the surface area of the pyramid to the nearest square metre.
a. 216 m^2
b. 322 m^2
c. 483 m^2
d. 305 m^2

____ 29. The surface area of a right cone is 383.0 m^2. The radius of the cone is 6.0 m. Determine the height of the cone to the nearest metre.
a. 13 m
b. 15 m
c. 14 m
d. 12 m

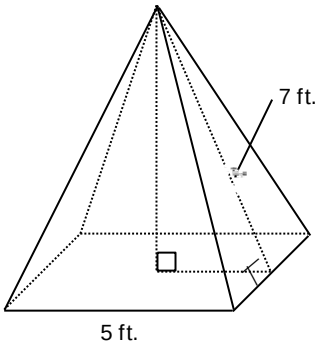
____ 30. A right cone has a height of 13 cm and a base diameter of 19 cm. Determine the surface area of the cone to the nearest square centimetre.
a. 764 cm^2
b. 672 cm^2
c. 481 cm^2
d. 1245 cm^2

____ 31. Calculate the slant height, *s*, of this right square pyramid to the nearest tenth of a centimetre.



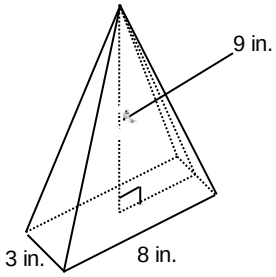
a. 11.9 cm b. 6.1 cm c. 12.1 cm d. 16.6 cm

____ 32. Calculate the volume of this right square pyramid to the nearest cubic foot.



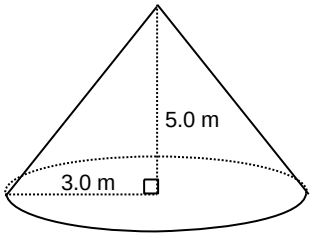
a. 58 cubic feet b. 62 cubic feet c. 54 cubic feet d. 163 cubic feet

____ 33. Calculate the volume of this right rectangular pyramid to the nearest cubic inch.



a. 216 cubic inches b. 72 cubic inches c. 64 cubic inches d. 78 cubic inches

____ 34. Calculate the volume of this right cone to the nearest tenth of a cubic metre.



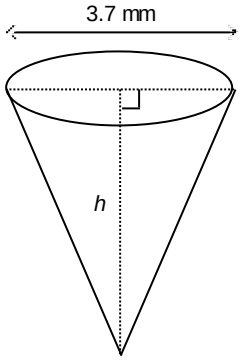
a. 141.4 m^3 b. 47.1 m^3 c. 49.3 m^3 d. 55.0 m^3

____ 35. A right rectangular prism with base dimensions 7.8 m by 5.1 m has a volume of 110.1 m^3. Determine the height of the prism to the nearest tenth of a metre.
a. 2.8 m b. 8.3 m c. 1.2 m d. 5.5 m

____ 36. A right cone has slant height 15 in. and base diameter 12 in. Determine its volume to the nearest cubic inch.
a. 1555 cubic inches b. 396 cubic inches c. 518 cubic inches d. 543 cubic inches

____ 37. A right cylindrical can has a volume of 263.1 cm^3. What is the volume of a right cone with the same base and the same height, to the nearest tenth of a centimetre?
a. 131.6 cm b. 91.7 cm c. 89.7 cm d. 87.7 cm

____ 38. The volume of this right cone is 14.7 mm^3. Calculate its height, *h*, to the nearest tenth of a millimetre.



a. 4.1 mm b. 1.0 mm c. 1.4 mm d. 2.8 mm

____ 39. The radius of a volleyball is approximately 10 cm. Determine the surface area of a volleyball to the nearest square centimetre.
a. 5027 cm^2 b. 1257 cm^2 c. 314 cm^2 d. 4189 cm^2

____ 40. The surface area of a tennis ball is approximately 23 square inches. What is the diameter of the tennis ball to the nearest inch?
a. 3 in. b. 1 in. c. 4 in. d. 6 in.

____ 41. Mars approximates a sphere with radius 2125 mi. What is the approximate volume of Mars?
a. 3.2×10^{11} $mi.^3$ b. 4.0×10^{10} $mi.^3$ c. 5.7×10^{7} $mi.^3$ d. 7.1×10^{11} $mi.^3$

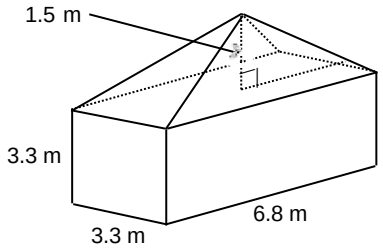
____ 42. A hemisphere has radius 14.9 cm. What is the surface area of the hemisphere to the nearest tenth of a square centimetre?
a. 2092.4 cm^2 b. 6928.2 cm^2 c. 1488.5 cm^2 d. 1394.9 cm^2

____ 43. A hemisphere has radius 10.3 cm. What is the volume of the hemisphere to the nearest tenth of a cubic centimetre?
a. 4577.2 cm^3 b. 2288.6 cm^3 c. 1333.2 cm^3 d. 999.9 cm^3

____ 44. A sphere has a surface area of 8.6 m^2. What is the radius of the sphere to the nearest tenth of a metre?
a. 3.2 m b. 4.1 m c. 0.8 m d. 1.6 m

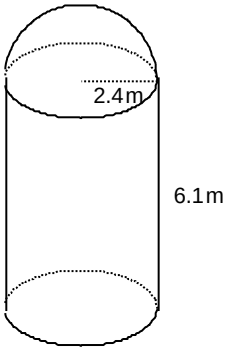
____ 45. The circumference of a beach ball is 57 cm. Determine its volume to the nearest cubic centimetre.
a. 25 019 cm^3 b. 1034 cm^3 c. 324 cm^3 d. 3127 cm^3

____ 46. Determine the volume of this composite object, which is a right square prism and a right rectangular pyramid, to the nearest tenth of a cubic metre.



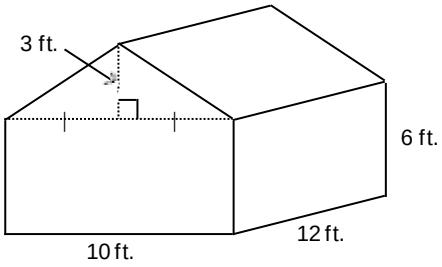
a. 85.3 m^3 b. 107.7 m^3 c. 90.7 m^3 d. 514.8 m^3

____ 47. Determine the surface area of this composite object, which is a right cylinder and a hemisphere, to the nearest tenth of a square metre.



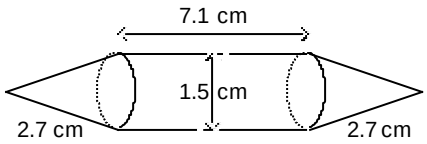
a. 182.5 m^2 b. 164.4 m^2 c. 128.2 m^2 d. 146.3 m^2

____ 48. A garden shed is a composite object formed by a right rectangular prism with a right triangular prism as its roof. Determine the surface area of the garden shed to the nearest square foot.



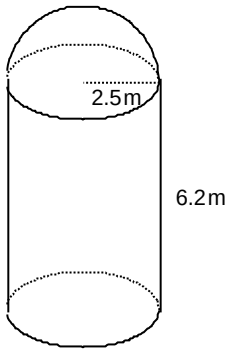
a. 366 square feet b. 554 square feet c. 434 square feet d. 464 square feet

____ 49. Determine the surface area of this composite object, which is a right cylinder and two right cones, to the nearest square centimetre.



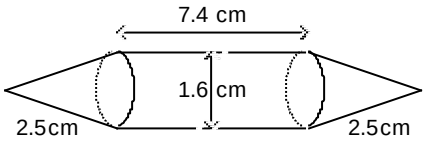
a. 43 cm^2 b. 50 cm^2 c. 40 cm^2 d. 46 cm^2

____ 50. Determine the volume of this composite object, which is a right cylinder and a hemisphere, to the nearest tenth of a cubic metre.



a. 156.3 m^3 b. 149.7 m^3 c. 187.2 m^3 d. 154.5 m^3

____ 51. Determine the volume of this composite object, which is a right cylinder and two right cones, to the nearest cubic centimetre.



a. 40 cm^3 b. 18 cm^3 c. 16 cm^3 d. 50 cm^3

Problem

52. Convert 22 yd. to feet. Use unit analysis to verify the conversion.

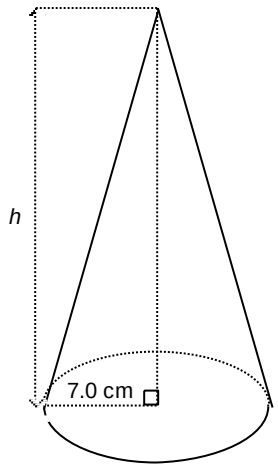
53. Explain how to convert a measurement of 20 000 ft. to miles, yards, and feet.

54. Sheila plans to place crown moulding along the top of each wall in her family room. A total of 506 in. of moulding is required. The moulding costs $1.49/ft. and is sold in 8-ft. lengths. What is the cost of the crown moulding, before taxes?

55. In track and field, the 440-yd. race was replaced with the 400-m race when Canada changed from the imperial system to the SI system. Which race is longer and by how much? Use the exact conversion: 1 yd. = 91.44 cm

56. Three wooden blocks need to be painted. The first block is a right rectangular pyramid with base dimensions 1.5 cm by 2.5 cm and a height of 2.0 cm . The second block is a right square pyramid with a base length of 2.8 cm and a height of 2.0 cm. The third block is a right cone with a height of 2.0 cm and a base diameter of 3.6 cm. Which block requires the most paint? Which block requires the least paint? Sketch diagrams to help explain your answer.

57. Nicole has this right cone, which has lateral area 414.5 cm^2. She needs a cone with height at least 15.5 cm for a craft project. Is this cone tall enough? Justify your answer.

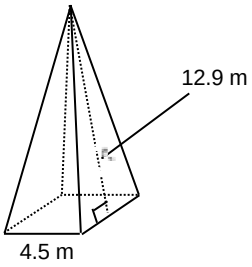


58. A right square pyramid has base perimeter 63.6 m and height 6.7 m. Calculate the volume of the pyramid to the nearest cubic metre.

59. A right cylinder has base radius 19.9 cm and height 19.9 cm. Determine the volume of a right cone with the same base and the same height, to the nearest tenth of a cubic centimetre.

60. Francis has three empty containers: a right rectangular prism, a right square pyramid, and a right cone. Each container has height 2.0 cm. The prism has base dimensions 1.5 cm by 2.5 cm. The pyramid has base side length 3.4 cm. The cone has base diameter 3.8 cm. Determine the volume of each container to the nearest tenth of a cubic centimetre. Which container has the least volume? Which container has the greatest volume? Explain your answer.

61. Determine the volume of a right prism that has the same base and the same height as the right square pyramid below. Give your answer to the nearest tenth of a cubic metre. Explain your answer.



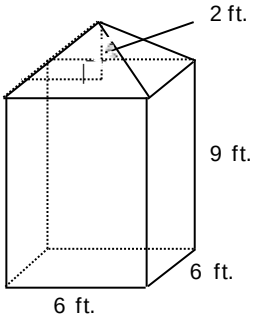
62. A right cone has a base diameter of 8 in. and a volume of 189 cubic inches. Determine the slant height of the cone to the nearest inch.

63. A candle approximates a sphere with circumference 22 cm. The surface of the candle is to be covered with glitter.
    a) Determine the radius of the candle to the nearest centimetre.
    b) Determine the surface area of the candle to the nearest square centimetre.

64. A hemisphere has radius 23.2 m.
    a) Determine the surface area of the hemisphere to the nearest tenth of a square metre.
    b) Determine the volume of the hemisphere to the nearest tenth of a cubic metre.

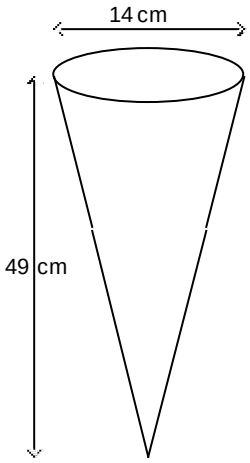
65. A pail of ice cream is cylindrical, with diameter 10 in. and height 14 in. A scoop makes a sphere of ice cream with diameter 2 in. How many full scoops of ice cream can be made from this pail?

66. Determine the surface area of this composite object, which is a right square prism and a right square pyramid, to the nearest square foot. Explain your answer.

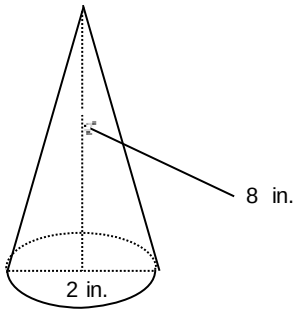


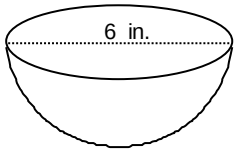
67. A solid sphere just fits inside a cube that has an edge length equal to the diameter of the sphere. The edge length of the cube is 4.9 cm. What is the volume of air in the cube to the nearest cubic centimetre?

68. This cone was cut from a right rectangular prism with dimensions 20 cm by 22 cm by 66 cm. What volume of the right rectangular prism, in cubic centimetres, remains?



69. The base of this cone is to be glued to the circular face of the hemisphere. Calculate the surface area of the composite object formed, to the nearest square inch.





70. A sculpture comprises a right rectangular prism with base dimensions 30 m by 32 m, and height 16 m. A right cylinder with base diameter 8 m and height 16 m sits on top of the prism.
    a) Determine the volume of the sculpture to the nearest cubic metre.
    b) Determine the surface area of the sculpture to the nearest square metre.

Unit 1 Review
Answer Section

MULTIPLE CHOICE

1.	ANS: B	PTS: 1	DIF: Easy	REF: 1.1 Imperial Measures of Length
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
2.	ANS: B	PTS: 1	DIF: Easy	REF: 1.1 Imperial Measures of Length
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
3.	ANS: C	PTS: 1	DIF: Easy	REF: 1.1 Imperial Measures of Length
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
4.	ANS: C	PTS: 1	DIF: Moderate	REF: 1.1 Imperial Measures of Length
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
5.	ANS: D	PTS: 1	DIF: Moderate	REF: 1.1 Imperial Measures of Length
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
6.	ANS: A	PTS: 1	DIF: Easy	REF: 1.2 Measuring Length and Distance
	LOC: 10.M1	TOP: Measurement		KEY: Conceptual Understanding
7.	ANS: C	PTS: 1	DIF: Easy	REF: 1.2 Measuring Length and Distance
	LOC: 10.M1	TOP: Measurement		KEY: Conceptual Understanding
8.	ANS: D	PTS: 1	DIF: Easy	REF: 1.2 Measuring Length and Distance
	LOC: 10.M1	TOP: Measurement		KEY: Conceptual Understanding
9.	ANS: B	PTS: 1	DIF: Easy	REF: 1.2 Measuring Length and Distance
	LOC: 10.M1	TOP: Measurement		KEY: Conceptual Understanding
10.	ANS: D	PTS: 1	DIF: Easy	REF: 1.2 Measuring Length and Distance
	LOC: 10.M1	TOP: Measurement		KEY: Conceptual Understanding
11.	ANS: C	PTS: 1	DIF: Easy	REF: 1.2 Measuring Length and Distance
	LOC: 10.M1	TOP: Measurement		KEY: Conceptual Understanding
12.	ANS: B	PTS: 1	DIF: Easy	REF: 1.2 Measuring Length and Distance
	LOC: 10.M1	TOP: Measurement		KEY: Conceptual Understanding
13.	ANS: B	PTS: 1	DIF: Easy	REF: 1.3 Relating SI and Imperial Units
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
14.	ANS: A	PTS: 1	DIF: Easy	REF: 1.3 Relating SI and Imperial Units
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
15.	ANS: A	PTS: 1	DIF: Easy	REF: 1.3 Relating SI and Imperial Units
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
16.	ANS: C	PTS: 1	DIF: Moderate	REF: 1.3 Relating SI and Imperial Units
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
17.	ANS: C	PTS: 1	DIF: Moderate	REF: 1.3 Relating SI and Imperial Units
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
18.	ANS: C	PTS: 1	DIF: Moderate	REF: 1.3 Relating SI and Imperial Units
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
19.	ANS: C	PTS: 1	DIF: Easy	REF: 1.3 Relating SI and Imperial Units
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
20.	ANS: A	PTS: 1	DIF: Difficult	REF: 1.3 Relating SI and Imperial Units
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge
21.	ANS: D	PTS: 1	DIF: Easy	REF: 1.3 Relating SI and Imperial Units
	LOC: 10.M2	TOP: Measurement		KEY: Procedural Knowledge

22. ANS: C PTS: 1 DIF: Easy
REF: 1.4 Surface Areas of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
23. ANS: A PTS: 1 DIF: Moderate
REF: 1.4 Surface Areas of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
24. ANS: D PTS: 1 DIF: Moderate
REF: 1.4 Surface Areas of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
25. ANS: B PTS: 1 DIF: Moderate
REF: 1.4 Surface Areas of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
26. ANS: A PTS: 1 DIF: Easy
REF: 1.4 Surface Areas of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
27. ANS: B PTS: 1 DIF: Moderate
REF: 1.4 Surface Areas of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
28. ANS: D PTS: 1 DIF: Moderate
REF: 1.4 Surface Areas of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
29. ANS: A PTS: 1 DIF: Difficult
REF: 1.4 Surface Areas of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
30. ANS: A PTS: 1 DIF: Moderate
REF: 1.4 Surface Areas of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
31. ANS: C PTS: 1 DIF: Difficult
REF: 1.4 Surface Areas of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
32. ANS: C PTS: 1 DIF: Moderate
REF: 1.5 Volumes of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
33. ANS: B PTS: 1 DIF: Easy
REF: 1.5 Volumes of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
34. ANS: B PTS: 1 DIF: Easy
REF: 1.5 Volumes of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
35. ANS: A PTS: 1 DIF: Moderate
REF: 1.5 Volumes of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
36. ANS: C PTS: 1 DIF: Moderate
REF: 1.5 Volumes of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
37. ANS: D PTS: 1 DIF: Moderate
REF: 1.5 Volumes of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge
38. ANS: A PTS: 1 DIF: Moderate

REF: 1.5 Volumes of Right Pyramids and Right Cones LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

39. ANS: B PTS: 1 DIF: Easy
REF: 1.6 Surface Area and Volume of a Sphere LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

40. ANS: A PTS: 1 DIF: Moderate
REF: 1.6 Surface Area and Volume of a Sphere LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

41. ANS: B PTS: 1 DIF: Easy
REF: 1.6 Surface Area and Volume of a Sphere LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

42. ANS: A PTS: 1 DIF: Easy
REF: 1.6 Surface Area and Volume of a Sphere LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

43. ANS: B PTS: 1 DIF: Easy
REF: 1.6 Surface Area and Volume of a Sphere LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

44. ANS: C PTS: 1 DIF: Moderate
REF: 1.6 Surface Area and Volume of a Sphere LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

45. ANS: D PTS: 1 DIF: Moderate
REF: 1.6 Surface Area and Volume of a Sphere LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

46. ANS: A PTS: 1 DIF: Easy
REF: 1.7 Solving Problems Involving Objects LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

47. ANS: D PTS: 1 DIF: Easy
REF: 1.7 Solving Problems Involving Objects LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

48. ANS: C PTS: 1 DIF: Moderate
REF: 1.7 Solving Problems Involving Objects LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

49. ANS: D PTS: 1 DIF: Moderate
REF: 1.7 Solving Problems Involving Objects LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

50. ANS: D PTS: 1 DIF: Easy
REF: 1.7 Solving Problems Involving Objects LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

51. ANS: B PTS: 1 DIF: Moderate
REF: 1.7 Solving Problems Involving Objects LOC: 10.M3
TOP: Measurement KEY: Procedural Knowledge

PROBLEM

52. ANS:
Since 1 yd. = 3 ft., to convert yards to feet, multiply by 3.
22 yd. = 22(3 ft.)
22 yd. = 66 ft.

Write a conversion factor for yards and feet,
with feet in the numerator: $\frac{3 \text{ ft.}}{1 \text{ yd.}}$

Then, $22 \text{ yd.} \times \frac{3 \text{ ft.}}{1 \text{ yd.}} = \frac{22 \text{ yd.}}{1} \times \frac{3 \text{ ft.}}{1 \text{ yd.}}$

$= \frac{22 \text{ yd.}}{1} \times \frac{3 \text{ ft.}}{1 \text{ yd.}}$

$= \frac{66 \text{ ft.}}{1}$

$= 66 \text{ ft.}$

Since the measurements are equal, the conversion is verified.

PTS: 1 DIF: Moderate REF: 1.1 Imperial Measures of Length
LOC: 10.M2 TOP: Measurement KEY: Procedural Knowledge

53. ANS:
Since 5280 ft. = 1 mi., to convert feet to miles, divide by 5280.

20 000 ft. = $\frac{20\,000}{5280}$ mi.

20 000 ft. = $3\frac{4160}{5280}$ mi.

20 000 ft. = 3 mi. 4160 ft.

Since 3 ft. = 1 yd., to convert feet to yards, divide by 3.

4160 ft. = $\frac{4160}{3}$ yd.

4160 ft. = $1386\frac{2}{3}$ yd.

4160 ft. = 1386 yd. 2 ft.

So, 20 000 ft. = 3 mi. 1386 yd. 2 ft.

PTS: 1 DIF: Moderate REF: 1.1 Imperial Measures of Length
LOC: 10.M2 TOP: Measurement
KEY: Communication | Problem-Solving Skills

54. ANS:
To convert inches to feet and inches, divide by 12.

506 in. = $\frac{506}{12}$ ft.

506 in. = $42\frac{2}{12}$ ft.

506 in. = 42 ft. 2 in.

Sheila requires approximately 43 ft. of moulding. To find the number of 8-ft. lengths Sheila needs, divide 43 by 8.

$\frac{43 \text{ ft.}}{8 \text{ ft.}} = 5\frac{3}{8}$

The number of 8-ft. lengths is greater than 5, so Sheila must buy 6 lengths.
The total number of feet in 6 lengths is: 6(8 ft.) = 48 ft.

The cost, *C*, is:
$C = 48(\$1.49)$

$C = \$71.52$
Before taxes, the crown moulding will cost $71.52.

PTS: 1 DIF: Moderate REF: 1.1 Imperial Measures of Length
LOC: 10.M2 TOP: Measurement KEY: Problem-Solving Skills

55. ANS:
Convert 440 yd. to centimetres.

$1 \text{ yd.} = 91.44 \text{ cm}$

So, $440 \text{ yd.} = 440(91.44 \text{ cm})$

$440 \text{ yd.} = 40\ 233.6 \text{ cm}$

Convert 40 233.6 cm to metres.

$1 \text{ m} = 100 \text{ cm}$

So, $40\ 233.6 \text{ cm} = \frac{40\ 233.6}{100} \text{ m}$

$= 402.336 \text{ m}$

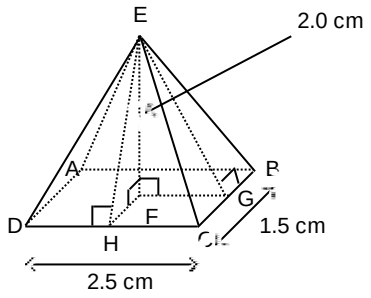
Since 402.336 m > 400 m, the 440-yd. race is longer.

$402.336 \text{ m} - 400 \text{ m} = 2.336 \text{ m}$
The 440-yd. race is longer than the 400-m race by approximately 2.3 m.

PTS: 1 DIF: Moderate REF: 1.3 Relating SI and Imperial Units
LOC: 10.M2 TOP: Measurement KEY: Problem-Solving Skills

56. ANS:
Surface area of right rectangular pyramid:
Sketch the pyramid and label its vertices.

In ΔEFH, FH is $\frac{1}{2}$ the length of BC, so FH is 0.75 cm.
EF is the height of the pyramid, which is 2.0 cm.
Use the Pythagorean Theorem in right ΔEFH.



$EH^2 = EF^2 + FH^2$

$EH^2 = 2.0^2 + 0.75^2$

$EH^2 = 4.5625$

$EH = \sqrt{4.5625}$

Area, *A*, of ΔEDC is:

$A = \frac{1}{2}(2.5)(\sqrt{4.5625})$

$A = 1.25(\sqrt{4.5625})$

Since ΔEDC and ΔEAB are congruent, the area of ΔEAB is $1.25(\sqrt{4.5625})$.
In ΔEFG, FG is $\frac{1}{2}$ the length of DC, so FG is 1.25 cm.
Use the Pythagorean Theorem in right ΔEFG.

$EG^2 = EF^2 + FG^2$

$EG^2 = 2.0^2 + 1.25^2$

$EG^2 = 5.5625$

$EG = \sqrt{5.5625}$

Area, *A*, of ΔEBC is:

$A = \frac{1}{2}(1.5)(\sqrt{5.5625})$

$A = 0.75(\sqrt{5.5625})$

Since ΔEBC and ΔEAD are congruent, the area of ΔEAD is $0.75(\sqrt{5.5625})$.

Area, *B*, of the base of the pyramid is:
$B = (1.5)(2.5)$
$B = 3.75$

Each of two triangles has area $1.25(\sqrt{4.5625})$, and each of the other two triangles has area $0.75(\sqrt{5.5625})$.

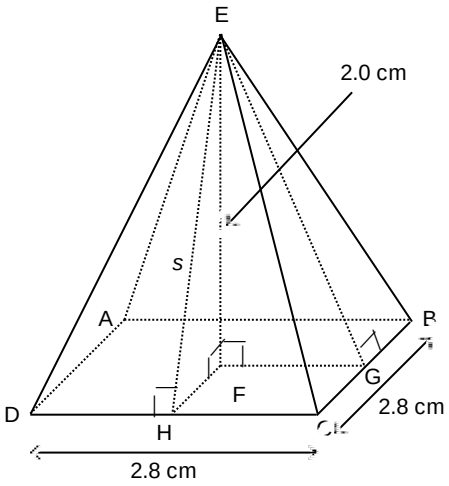
Surface area, *SA*, of the right rectangular pyramid is:

$SA = 2(1.25)(\sqrt{4.5625}) + 2(0.75)(\sqrt{5.5625}) + 3.75$

$SA = 12.6277\ldots$

The surface area of the right rectangular pyramid is approximately 12.6 cm^2.

Surface area of right square pyramid:
Sketch the pyramid and label its vertices.



In ΔEFH, FH is $\frac{1}{2}$ the length of BC, so FH is 1.4 cm.
Use the Pythagorean Theorem in right ΔEFH to find the slant height, *s*.
$s^2 = EF^2 + FH^2$
$s^2 = 2.0^2 + 1.4^2$
$s^2 = 4.0 + 1.96$
$s^2 = 5.96$
$s = \sqrt{5.96}$

Surface area, *SA*, of the right square pyramid is:

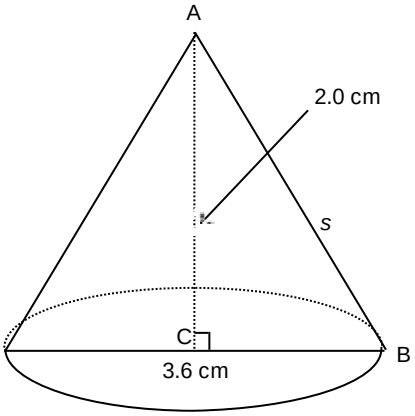
$SA = (\frac{1}{2})s(\text{perimeter of base}) + (\text{base area})$

$SA = (\frac{1}{2})(\sqrt{5.96})(2.8 \times 4) + (2.8 \times 2.8)$

$SA = (\frac{1}{2})(\sqrt{5.96})(11.2) + 7.84$

$SA = 21.5113...$
The surface area of the right square pyramid is approximately 21.5 cm^2.

Surface area of right cone:
Sketch a diagram.



In ΔABC, BC is $\frac{1}{2}$ the diameter of the cone, so BC is 1.8 cm.
Use the Pythagorean Theorem to find the slant height, *s*.
$s^2 = AC^2 + BC^2$
$s^2 = 2.0^2 + 1.8^2$
$s^2 = 4.0 + 3.24$
$s^2 = 7.24$
$s = \sqrt{7.24}$

Surface area, *SA*, of the right cone is:
$SA = \pi rs + \pi r^2$

$SA = \pi(1.8)(\sqrt{7.24}) + \pi(1.8)^2$

$SA = 25.3944...$
The surface area of the right cone is approximately 25.4 cm^2.

So, the block that is a right cone requires the most paint and the block that is a right rectangular pyramid requires the least paint.

PTS: 1 DIF: Difficult REF: 1.4 Surface Areas of Right Pyramids and Right Cones
LOC: 10.M3 TOP: Measurement
KEY: Communication | Problem-Solving Skills

57. ANS:

Use the formula for lateral area, A_L, of the cone and solve for s.

$A_L = \pi rs$

$414.5 = \pi(7.0)s$

$\frac{414.5}{7.0\pi} = \frac{7.0\pi s}{7.0\pi}$

$s = \frac{414.5}{7.0\pi}$

$s = 18.8484...$

To determine the height of the cone, use the Pythagorean Theorem in right ΔABC.

$7.0^2 + h^2 = s^2$

$49.0 + h^2 = (18.8484...)^2$

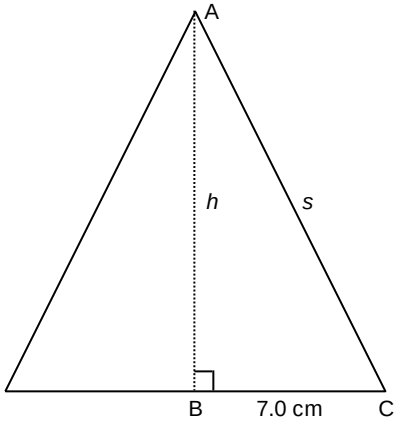
$h^2 = 355.2656... - 49.0$

$h^2 = 306.2656...$

$h = \sqrt{306.2656...}$

$h = 17.5004...$

The height of the cone is approximately 17.5 cm. The cone is tall enough for Nicole's craft project.



PTS: 1 DIF: Difficult REF: 1.4 Surface Areas of Right Pyramids and Right Cones
LOC: 10.M3 TOP: Measurement
KEY: Communication | Problem-Solving Skills

58. ANS:

The perimeter of the square base is 63.6 m. So, the side length of the base is: $\frac{63.6 \text{ m}}{4} = 15.9 \text{ m}$

Use the formula for the volume of a right rectangular pyramid.

$V = \frac{1}{3}lwh$

$V = \frac{1}{3}(15.9)(15.9)(6.7)$

$V = 564.609$

The volume of the pyramid is approximately 565 m^3.

PTS: 1 DIF: Moderate REF: 1.5 Volumes of Right Pyramids and Right Cones
LOC: 10.M3 TOP: Measurement KEY: Problem-Solving Skills

59. ANS:
Use the formula for the volume of a right cylinder.

$V = \pi r^2 h$

$V = \pi(19.9)^2(19.9)$

$V = 24\,757.6319\ldots$

The volume of a right cone is $\frac{1}{3}$ the volume of a right cylinder with the same base and the same height.

$V = \frac{1}{3}(24\,757.6319\ldots)$

$V = 8252.5439\ldots$

The volume of the right cone is approximately 8252.5 cm^3.

PTS: 1 DIF: Easy REF: 1.5 Volumes of Right Pyramids and Right Cones
LOC: 10.M3 TOP: Measurement KEY: Problem-Solving Skills

60. ANS:
Right rectangular prism:
Use the formula for the volume of a right rectangular prism.

$V = lwh$

$V = (1.5)(2.5)(2.0)$

$V = 7.5$

The volume of the prism is 7.5 cm^3.

Right square pyramid:
Use the formula for the volume of a right rectangular pyramid.

$V = \frac{1}{3}lwh$

$V = \frac{1}{3}(3.4)(3.4)(2.0)$

$V = 7.7066\ldots$

The volume of the pyramid is approximately 7.7 cm^3.

Right cone:

The radius, *r*, of the base of the cone is $\frac{1}{2}$ the diameter.

$r = \frac{1}{2}(3.8\text{ cm})$

$r = 1.9\text{ cm}$

Use the formula for the volume of a right cone.

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\pi(1.9)^2(2.0)$

$V = 7.5607\ldots$

The volume of the cone is approximately 7.6 cm^3.

Since $7.5 < 7.6 < 7.7$, the right rectangular prism has the least volume and the right square pyramid has the greatest volume.

PTS: 1 DIF: Moderate REF: 1.5 Volumes of Right Pyramids and Right Cones
LOC: 10.M3 TOP: Measurement
KEY: Communication | Problem-Solving Skills

61. ANS:

Calculate the height of the pyramid.
Let *h* metres represent the height.

In right ΔABC, BC is $\frac{1}{2}$ the side length of the base, so BC = 2.25 m.

Use the Pythagorean Theorem in right ΔABC to calculate *h*.

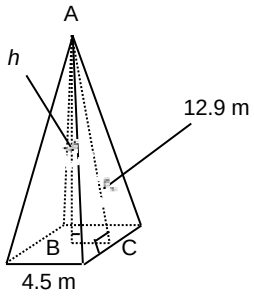
$h^2 + 2.25^2 = 12.9^2$

$h^2 + 5.0625 = 166.41$

$h^2 = 166.41 - 5.0625$

$h^2 = 161.3475$

$h = \sqrt{161.3475}$



The height is $\sqrt{161.3475}$ m.
Use the formula for the volume of a right rectangular pyramid.

Volume = $\frac{1}{3}lwh$

$V = \frac{1}{3}(4.5)(4.5)(\sqrt{161.3475})$

$V = 85.7402...$

The volume of a right prism is 3 times the volume of a right pyramid with the same base and the same height.
$V = 3(85.7402...)$

$V = 257.2208...$
The volume of the right prism is approximately 257.2 m^3.

PTS: 1 DIF: Difficult REF: 1.5 Volumes of Right Pyramids and Right Cones
LOC: 10.M3 TOP: Measurement
KEY: Communication | Problem-Solving Skills

62. ANS:

The radius, *r*, of the base of the cone is $\frac{1}{2}$ the diameter.

$r = \frac{1}{2}(8 \text{ in.})$

$r = 4 \text{ in.}$

Use the formula for the volume of a cone.

$$V = \frac{1}{3}\pi r^2 h$$

$$189 = \frac{1}{3}\pi(4)^2 h$$

$$3(189) = 3\left(\frac{1}{3}\pi(4)^2 h\right)$$

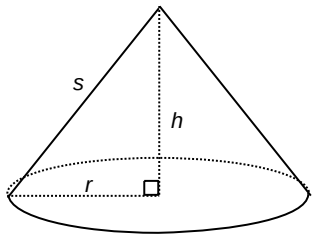
$$567 = 16\pi h$$

$$\frac{567}{16\pi} = \frac{16\pi h}{16\pi}$$

$$\frac{567}{16\pi} = h$$

$$h = 11.2801\ldots$$

Use the Pythagorean Theorem to calculate the slant height, *s*.



$$s^2 = r^2 + h^2$$

$$s^2 = 4^2 + 11.2801\ldots^2$$

$$s^2 = 16 + 127.2408\ldots$$

$$s^2 = 143.2408\ldots$$

$$s = \sqrt{143.2408\ldots}$$

$$s = 11.9683\ldots$$

The slant height is approximately 12 in.

PTS: 1 DIF: Difficult REF: 1.5 Volumes of Right Pyramids and Right Cones
LOC: 10.M3 TOP: Measurement KEY: Problem-Solving Skills

63. ANS:

a) Use the circumference, *C*, to determine the radius, *r*.

$$C = 2\pi r$$

$$22 = 2\pi r$$

$$\frac{22}{2\pi} = \frac{2\pi r}{2\pi}$$

$$\frac{22}{2\pi} = r$$

$$r = 3.5014\ldots$$

The radius of the candle is approximately 4 cm.

b) Use the formula for the surface area of a sphere.

$SA = 4\pi r^2$

$SA = 4\pi(3.5014\ldots)^2$

$SA = 154.0619\ldots$

The surface area of the candle is approximately 154 cm^2.

PTS: 1 DIF: Moderate REF: 1.6 Surface Area and Volume of a Sphere
LOC: 10.M3 TOP: Measurement KEY: Problem-Solving Skills

64. ANS:

a) SA of a hemisphere = SA of one-half a sphere + area of a circle

$SA = \frac{1}{2}\left(4\pi r^2\right) + \pi r^2$

$SA = 2\pi r^2 + \pi r^2$

$SA = 3\pi r^2$

$SA = 3\pi(23.2)^2$

$SA = 5072.7924\ldots$

The surface area of the hemisphere is approximately 5072.8 m^2.

b) Volume of a hemisphere = volume of one-half a sphere

$V = \frac{1}{2}\left(\frac{4}{3}\pi r^3\right)$

$V = \frac{2}{3}\pi r^3$

$V = \frac{2}{3}\pi(23.2)^3$

$V = 26\,153.0635\ldots$

The volume of the hemisphere is approximately 26 153.1 m^3.

PTS: 1 DIF: Moderate REF: 1.6 Surface Area and Volume of a Sphere
LOC: 10.M3 TOP: Measurement KEY: Problem-Solving Skills

65. ANS:

Volume of ice cream in the pail:
Use the formula for the volume of a cylinder.
The radius, *r*, is:

$r = \frac{1}{2}(10\text{ in.})$

$r = 5\text{ in.}$

$V = \pi r^2 h$

$V = \pi(5)^2(14)$

$V = 1099.5574\ldots$

Volume of ice cream in a scoop:
Use the formula for the volume of a sphere.

The radius, *r*, is:

$r = \frac{1}{2}(2 \text{ in.})$

$r = 1 \text{ in.}$

$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi(1)^3$

$V = 4.1887\ldots$

Number of scoops of ice cream:

$\frac{1099.5574\ldots}{4.1887\ldots} = 262.5$

The number of full scoops of ice cream that can be made from this pail is 262.

PTS: 1 DIF: Difficult REF: 1.6 Surface Area and Volume of a Sphere
LOC: 10.M3 TOP: Measurement KEY: Problem-Solving Skills

66. ANS:

The surface area of the composite object is: area of the 4 rectangular faces of the prism + area of square base of the prism + area of 4 triangular faces of the pyramid

The area of the 4 rectangular faces of the prism, in square feet, is:

$A = 4(6)(9)$

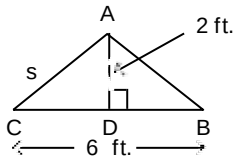
$A = 216$

The area of the square base of the prism, in square feet, is:

$A = (6)(6)$

$A = 36$

To determine the surface area of the triangular faces, calculate the slant height, *s*.
Sketch a triangle to represent a triangular face.



Use the Pythagorean Theorem in right ΔADB.

$s^2 = AD^2 + BD^2$

$s^2 = 2^2 + 3^2$

$s^2 = 4 + 9$

$s^2 = 13$

$s = \sqrt{13}$

The area of the 4 triangular faces of the pyramid, in square feet, is:

$A = 4(\frac{1}{2})(6)(\sqrt{13})$

$A = 43.2666...$

The surface area of the composite object, in square feet, is:

$216 + 36 + 43.2666... = 295.2666...$

The surface area of the composite object is approximately 295 square feet.

PTS: 1 DIF: Difficult REF: 1.7 Solving Problems Involving Objects
LOC: 10.M3 TOP: Measurement
KEY: Communication | Problem-Solving Skills

67. ANS:

Volume of air in the cube = volume of cube – volume of sphere
Use the formula for the volume of a cube.

$V = lwh$

$V = (4.9)(4.9)(4.9)$

$V = 117.649$

Use the formula for the volume of a sphere.
The radius, *r*, is:

$r = \frac{1}{2}(4.9 \text{ cm})$

$r = 2.45 \text{ cm}$

$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi(2.45)^3$

$V = 61.6008...$

The volume of air in the cube is:

$117.649 - 61.6008... = 56.0481...$

The volume of air in the cube is approximately 56 cm^3.

PTS: 1 DIF: Moderate REF: 1.7 Solving Problems Involving Objects
LOC: 10.M3 TOP: Measurement KEY: Problem-Solving Skills

68. ANS:

Volume remaining = volume of rectangular prism – volume of cone
Use the formula for the volume of a right rectangular prism.

$V = lwh$

$V = (20)(22)(66)$

$V = 29\,040$

Use the formula for the volume of a right cone.
The radius, *r*, is:

$r = \frac{1}{2}(14 \text{ cm})$

$r = 7 \text{ cm}$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\pi(7)^2(49)$

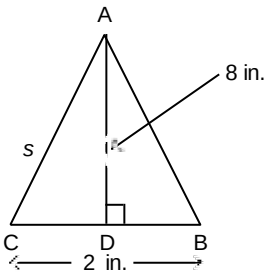
$V = 2514.3213\ldots$

The volume of the right rectangular prism that remains is:
$29\,040 - 2514.3213\ldots = 26\,525.6786\ldots$
The volume of the right rectangular prism that remains is approximately 26 526 cm^3.

PTS: 1 DIF: Difficult REF: 1.7 Solving Problems Involving Objects
LOC: 10.M3 TOP: Measurement KEY: Problem-Solving Skills

69. ANS:
Surface area of the composite object = lateral area of cone + surface area of hemisphere – area of base of cone

Use the formula to determine the lateral area of the cone.
Let *s* represent the slant height.
Use the Pythagorean Theorem in right ΔADB.



$s^2 = AD^2 + BD^2$

$s^2 = 8^2 + 1^2$

$s^2 = 64 + 1$

$s^2 = 65$

$s = \sqrt{65}$

The lateral area of the cone, in square inches, is:

$SA = \pi rs$

$SA = \pi(1)(\sqrt{65})$

$SA = 25.3283\ldots$

Use the formula to find the surface area of the hemisphere.
The radius, *r*, is:

$r = \frac{1}{2}(6 \text{ in.})$

$r = 3 \text{ in.}$

$SA = \frac{1}{2}(4\pi r^2) + \pi r^2$

$SA = 3\pi r^2$

$SA = 3\pi(3)^2$

$SA = 84.8230\ldots$

The area of the base of the cone, in square inches, is:

$SA = \pi r^2$

$SA = \pi(1)^2$

$SA = 3.1415\ldots$

The surface area of the composite object is:
$25.3283\ldots + 84.8230\ldots - 3.1415\ldots = 107.0097\ldots$
The surface area of the composite object is approximately 107 square inches.

PTS: 1 DIF: Difficult REF: 1.7 Solving Problems Involving Objects
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70. ANS:

a) Volume of sculpture = volume of prism + volume of cylinder
Use the formula for the volume of a right rectangular prism.

$V = lwh$

$V = (30)(32)(16)$

$V = 15\,360$

Use the formula for the volume of a right cylinder.
The radius, *r*, is:

$r = \frac{1}{2}(8\text{ m})$

$r = 4\text{ m}$

$V = \pi r^2 h$

$V = \pi(4)^2(16)$

$V = 804.2477\ldots$

The volume of the sculpture is:
$15\,360 + 804.2477\ldots = 16\,164.2477\ldots$
The volume of the sculpture is approximately 16 164 m^3.

b) The surface area of the sculpture is the sum of the areas of the faces of the right rectangular prism and the curved surface of the cylinder.

The area of the rectangular faces of the prism, in square metres, is:

$A = 2(30)(16) + 2(32)(16)$

$A = 1984$

The area of the rectangular bases of the prism, in square metres, is:

$A = 2(30)(32)$

$A = 1920$

Use the formula to find the area of the curved surface of the cylinder.
The radius, r, is:

$r = \frac{1}{2}(8\text{ m})$

$r = 4\text{ m}$

$SA = 2\pi rh$

$SA = 2\pi(4)(16)$

$SA = 402.1238\ldots$

The surface area of the sculpture is:

$1984 + 1920 + 402.1238\ldots = 4306.1238\ldots$

The surface area of the sculpture is approximately 4306 m^2.

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