Chapter 8 Questions

1) A 2L carton of milk costs $3.26. What is the unit rate?

a) $0.83/500mL
b) $3.26/2L
c) $0.61/L
d) $1.63/L

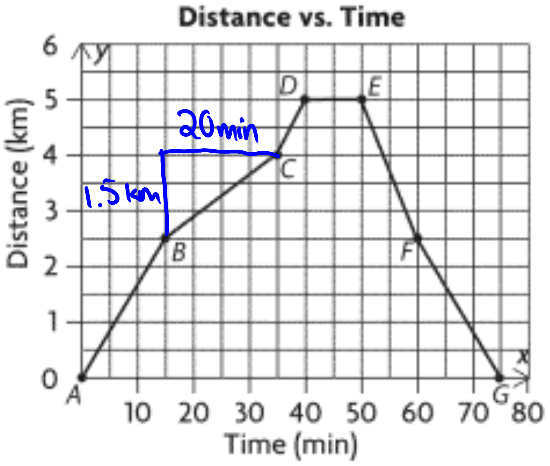
$\frac{\$3.26}{2L} \div 2 = \frac{\$1.63}{1L}$

2) It costs $4.37 for a 454g block of butter. What is the price per 100g?

a) $0.01/100g
b) $0.96/100g
c) $1.04/100g
d) $1.10/100g

$\frac{\$4.37}{454g} \div 454 = \frac{\$0.0096}{1g} \times 100 = \frac{\$0.96}{100g}$

3) The graph shows how a cyclist travels over time. Over which interval is the cyclist travelling the slowest?



a) BC
b) DE ← travels 0km in 10min (nowhere)
c) EF
d) FG

4) The graph in #3 shows how a cyclist travels over time. Over which interval is the cyclist travelling at 4.5 km/h?

a) AB
b) BC
c) CD
d) EF

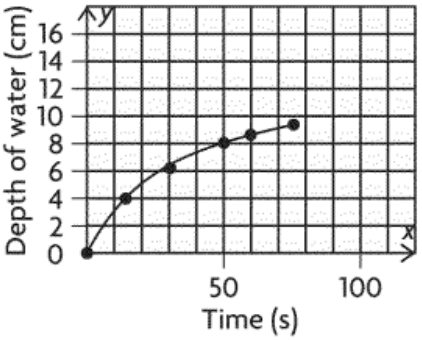
BC → travels 1.5 km in 20 min

$\frac{1.5km \times 3}{20min \times 3} = \frac{4.5\,km}{60\,min}$ or $\frac{4.5\,km}{1\,hr}$

5) Which situations could be described, in order, using the rates $15.56/lb, 80km/h, and $1.58/L?

a) Price of nails, average human running speed, price of sunflower oil.
b) Price of coffee, cruising speed of an airplane, price of milk.
c) Price of lobster, highway speed limit, price of apple juice.
d) Price of crude oil, average speed of a truck, price of cola.

6) Suppose that tap water, flowing out of a tap at a constant rate, is used to fill a container. Choose the container that represents the graph below.



a)
flask

b)
graduated cylinder

c)
beaker

d)
drinking glass

7) Which of the following is NOT equivalent to 0.85?

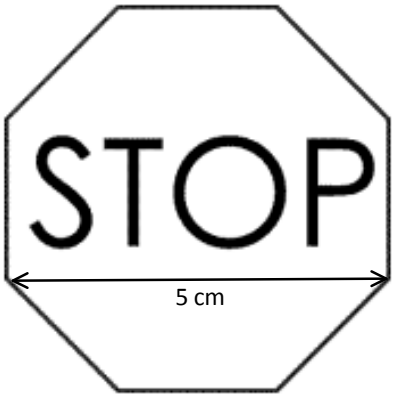
a) 85%

c) 0.85%

b) $\frac{85}{100}$

d) $\frac{17}{20}$

8) Stop signs have a standard width of 60 cm. If the width of the diagram is 5 cm, determine which scale factor was used to draw it.



a) 12
b) 12%
c) 8.3
d) 8.3%

Scale factor = $\frac{5}{60}$ $5 \div 60 \rightarrow 0.083\overline{3}$ $\times 100 \rightarrow 8.3\overline{3}\%$

↑ getting smaller (proper fraction)

9) Which of the following cylinders is similar to a cylinder that is 8 cm long and 2.5 cm in diameter? Choose the best answer.

a) A cylinder 4 cm long and 1.5 cm in diameter
b) A cylinder 12 cm long and 3.5 cm in diameter
c) A cylinder 16 cm long and 5 cm in diameter
d) All of the above

$\frac{\text{Long}}{\text{diameter}} = \frac{\text{Original}}{\text{Original}} = \frac{8}{2.5} = 3.2$

© $\frac{\text{Long}}{\text{diameter}} = \frac{16}{5} = 3.2$

10) Which scale factor(s) will produce an image that is SMALLER than the original?

I) 37% (percent less than 100%) II) $\frac{4}{12}$ (proper fraction) ~~III) 9.6~~

a) I only
b) I and II only
c) II and III only
d) I, II, and III

11) A 1:35 scale model of a fishing hut is 17 cm tall, 18 cm wide, and 19.7 cm long. What are the dimensions, in metres, of the actual ice fishing hut? (1 m = 100 cm)

a) 0.48 m by 0.51 m by 0.56 m
b) 4.86 m by 5.14 m by 5.63 m
c) 5.95 m by 6.3 m by 6.9 m
d) 595 m by 630 m by 690 m

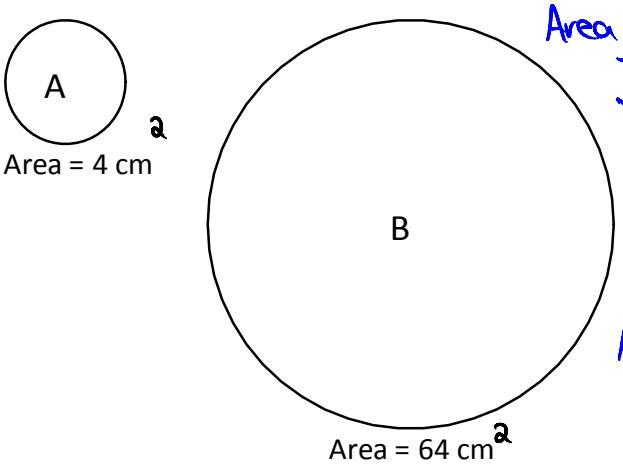
Actual is 35 times bigger
Model 17cm tall $\xrightarrow{\times 35}$ Actual 595cm tall or 5.95m tall

12) A triangle has an area of $6cm^2$ and is going to be enlarged by a scale factor of 3. What is the area of the enlarged triangle?

a) 2 cm^2
b) 3 cm^2
c) 18 cm^2
d) 54 cm^2

Area of original $\times (SF)^2$ = Area of new
$6 \times (3)^2$ = Area of new
6×9 = Area of new
$54\,cm^2$ = Area of new

13) Determine the scale factor that was used to go from circle A to circle B.



Area getting bigger, not smaller!

a) $\frac{1}{16}$
b) $\frac{1}{8}$
c) $\frac{1}{4}$
d) 4
e) 8
f) 16

Area of orig $\times (SF)^2$ = Area of new
$4 \times (SF)^2 = 64$
$\sqrt{(SF)^2} = \sqrt{16}$
$SF = 4$

14) Mr. Martens' computer screen has dimensions of 9 in by 12 in. The area of his projection screen is 4563 in^2. What scale factor is used to project his computer screen onto his projection screen?

not getting smaller!

a) 0.024
b) 0.154
c) 3.8025
d) 5.07
e) 6.5
f) 42.25

12 in, 9 in, $108\,in^2$ $\xrightarrow{\times (SF)^2}$ $4563\,in^2$

$108 \times (SF)^2 = 4563$
$\sqrt{(SF)^2} = \sqrt{42.25}$
$SF = 6.5$

15) Mr. Martens' classroom is 75 m^2.

What scale factor would he have to use in order to draw a scale diagram that has an area of 300 cm^2? (Important: 1 m^2 = 10 000 cm^2)

a) 0.02
b) 0.04
c) 0.25
d) 0.5
e) 2
f) 4

not getting bigger

Class: 75 m^2 or 750 000 cm^2 → ×(SF)² → Diagram: 300 cm^2

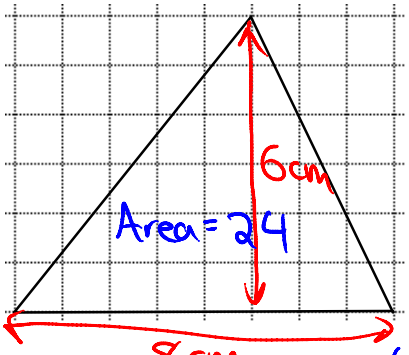
$750\,000 \times (SF)^2 = 300$

$\frac{750\,000}{750\,000} \quad \frac{300}{750\,000}$

$\sqrt{(SF)^2} = \sqrt{0.0004}$

$SF = 0.02$

16) Jason reduces this triangle by a scale factor of $\frac{1}{2}$.
Determine the area of the reduced figure, to the nearest tenth of a square unit.



a) 3
b) 6
c) 12
d) 24
e) 48

×(SF)² →

Area = $\frac{b \times h}{2}$

Area = $\frac{8 \times 6}{2}$

Area = 24

Area of orig × $(SF)^2$ = Area of new

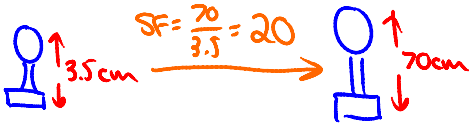
$24 \times \left(\frac{1}{2}\right)^2$ = Area of new

24×0.25 = Area of new

6 = Area of new

17) A stage director needs a large pawn for a scene. The pawn in her chess set is 3.5 cm tall and she estimates that the height of the enlarged pawn must be 70 cm.
How many times greater will the <u>surface area</u> of the larger pawn be?

a) 20
b) 40
c) 60
d) 400
e) 8000



Surface Area = $(SF)^2$ times as much
Surface Area = $(20)^2$ times as much
Surface Area = 400 times as much

18) A stage director needs a large pawn for a scene. The pawn in her chess set is 3.5 cm

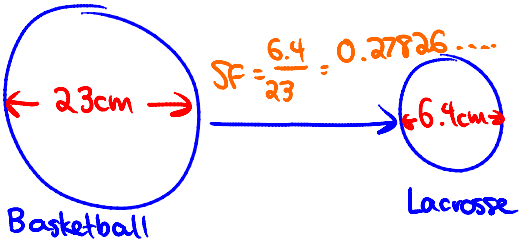
tall and she estimates that the height of the enlarged pawn must be 70 cm. How many times greater will the volume of the larger pawn be?

a) 20
b) 40
c) 60
d) 400
e) 8000

From previous question, SF = 20
Volume = $(SF)^3$ times as much
Volume = $(20)^3$ times as much
Volume = 8000 times as much

19) A lacrosse ball has a diameter of 6.4 cm.
A basketball has a diameter of about 23 cm.
The volume of a lacrosse ball is what percent of the volume of a basketball?

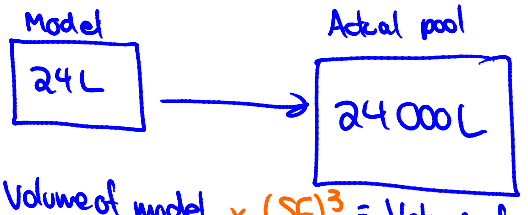
a) 2.2%
b) 7.7%
c) 12.5%
d) 28%



Volume of lacrosse = $(SF)^3$ of basketball
Volume of lacrosse = $(0.27826...)^3$ of basketball
Volume of lacrosse = 0.021545... of basketball
$\times 100\%$
Volume of lacrosse = 2.2% of basketball

20) The model of a swimming pool was used to build an actual swimming pool. If the model holds a volume of 24 L of water and the actual swimming pool holds a volume of 24 000 L of water, what scale factor was used to build the actual swimming pool?

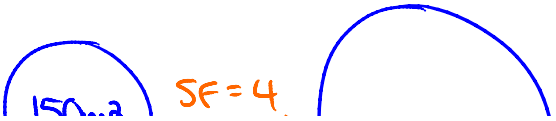
not getting smaller
a) 0.001
b) 0.032
c) 0.1
d) 10
e) 31.6
f) 1000



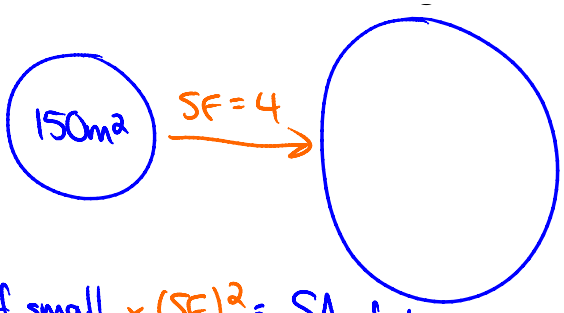
Volume of model $\times (SF)^3$ = Volume of pool
$24 \times (SF)^3 = 24000$
$\frac{24}{24} \quad \frac{24000}{24}$
$\sqrt[3]{(SF)^3} = \sqrt[3]{1000}$
SF = 10

21) The surface area of an oil tank is 150 m^2. A similar oil tank has dimensions that are larger by a scale factor of 4. What is the surface area of the larger tank?

not
a) 16 m^2
b) 64 m^2
c) 600 m^2
d) 2400 m^2
e) 9600 m^2



a) 16 m^2 — not getting smaller
b) 64 m^2
c) 600 m^2
d) 2400 m^2
e) 9600 m^2



SA of small $\times (SF)^2$ = SA of larger
$150 \times (4)^2$ = SA of larger
150×16 = SA of larger
$2400\ m^2$ = SA of larger

Written Answer Section. Show all of your work neatly for full marks.

22) Derek can buy whole chickens at Save On Foods for $3.61/kg or he can buy 10 lb for $17.40 at Buy Low Foods. Mathematically compare the two rates and determine the lower rate. (marks not given for answer only)

Save On
$\frac{\$3.61}{1\ kg} \times \frac{2.2}{2.2} = \frac{\$3.61 \div 2.2}{2.2\ lbs \div 2.2} = \frac{\$1.64}{1\ lb}$
1 kg = 2.2 lbs
lower rate

Buy Low
$\frac{\$17.40 \div 10}{10\ lb \div 10} = \frac{\$1.74}{1\ lb}$

23) Fuel economy in Canada is stated as L/100km.
Marie drove her Honda Civic from Vancouver to Calgary using a total of 80L of gas. Then, she drove from Calgary to Edmonton using a total of 26L of gas. The distance from Vancouver to Calgary is 970 km. The distance from Calgary to Edmonton is 300 km.
Mathematically, compare the fuel economy for each trip and state which trip had the better fuel economy.

Van → Cal
$\frac{80L \div 970}{970\ km \div 970} = \frac{0.08247L \times 100}{1\ km \times 100} = \frac{8.2L}{100km}$
better fuel economy!

Cal → Edm
$\frac{26L \div 300}{300\ km \div 300} = \frac{0.086L \times 100}{1\ km \times 100} = \frac{8.7L}{100km}$

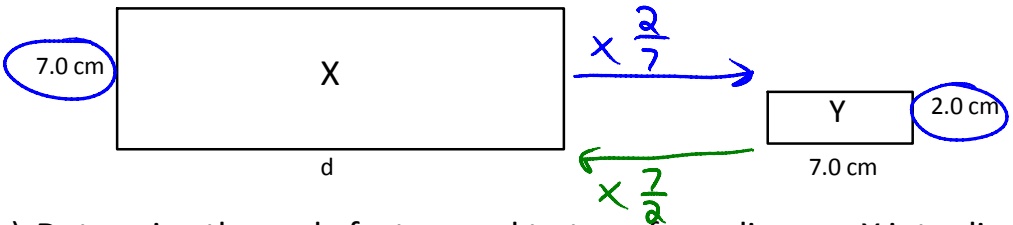
24) If Jason jogs at a constant speed, he can jog 1400 metres in 8 min.
If he continues at this speed, how many kilometres can he run in 1 hr 10 min?
70 min.

(round your answer to two decimal places)

400 metres / 8 min ÷8 = 175 m / 1 min ×70 = 12250 m / 70 min ÷1000 ✗ 12.25 km / 70 min

1 km = 1000 m

25) Diagrams X and Y are similar.



a) Determine the scale factor used to transform diagram X into diagram Y.
Express your scale factor as a fraction and as a percent to one decimal place.

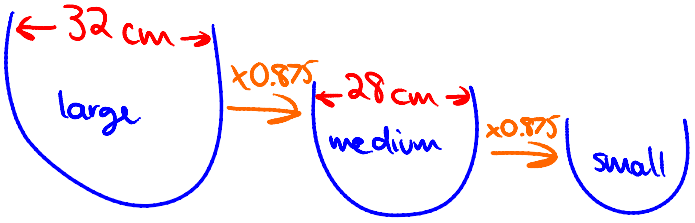
b) Calculate the length of side d to one decimal place.

(a) $\frac{2}{7}$ because it's getting smaller!

(b) from Y → X, scale factor is $\frac{7}{2}$ or 3.5

so.... $d = 7 \times 3.5 = 24.5$ cm

26) A cook has a set of three mixing bowls with lids.
The bowls stack inside each other and are similar to each other.
The diameters of the two largest bowls are 32 cm and 28 cm.
The scale factor is the same from each bowl to the next smaller bowl.
Calculate the diameter of the smallest bowl.



SF from large to medium = $\frac{28}{32}$ or 0.875

so... diameter of small = 28 × 0.875

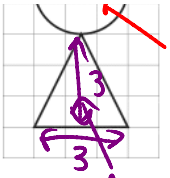
= 24.5 cm

27) Jeremy enlarges this figure by a scale factor of 150%.
Determine the area of the enlarged figure, to one decimal place.

1 square = 1 cm

SF = 150% same as 1.5

Area of original × (SF)² = Area of new



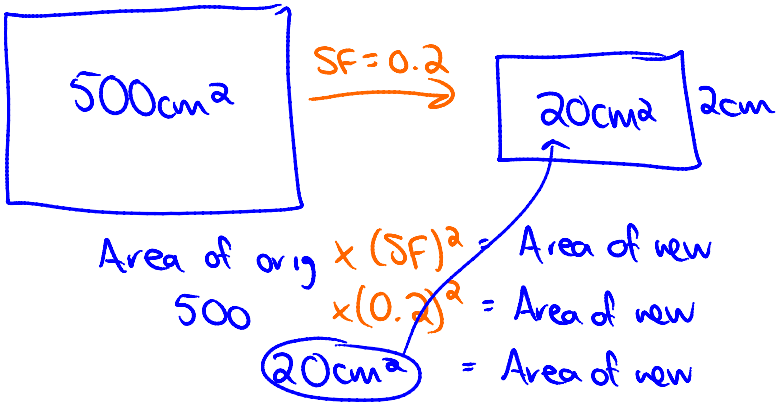
$A = \pi r^2$
$A = 3.14 \times 1.5^2$
$A = 7.065 cm^2$

$A = \frac{b \times h}{2}$
$A = \frac{3 \times 3}{2}$
$A = 4.5 cm^2$

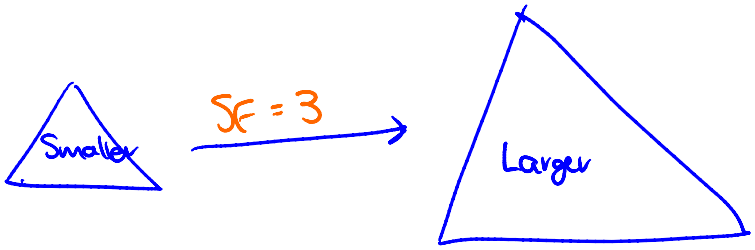
Total area = $11.565 cm^2$

$11.565 \times (1.5)^2$ = Area of new
11.565×2.25 = Area of new
$26.0 cm^2$ = Area of new

28) A rectangle with an area of 500 cm^2 is being reduced by a scale factor of 0.2.
Determine the length of the reduced rectangle if its width is 2 cm.



29) The scale factor for two similar triangles is 1:3.
The sum of their areas is 180 cm^2.
Determine the area of each triangle.



Area of larger is $(3)^2$ times more than area of smaller!
" " " " 9 " " " " " "

Guess + check!

$18 + 162 = 180$

9 times larger than 18

so... smaller triangle = $18 cm^2$
larger triangle = $162 cm^2$

30) The surface area of a gift box is 360 cm^2.
The volume of the same gift box is 480 cm^3.
What are the surface area and volume of the gift box after it is reduced by a scale factor of 0.5?

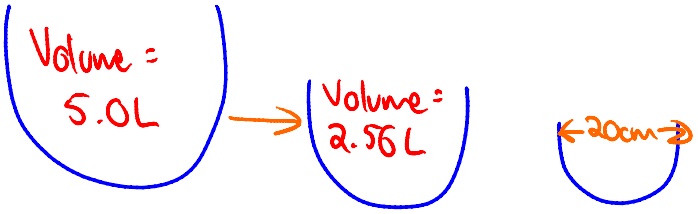
SA of original $\times (SF)^2$ = SA of new
$360 \times (0.5)^2$ = SA of new
$90 cm^2$ = SA of new

Vol of original $\times (SF)^3$ = Vol of new
$480 \times (0.5)^3$ = Vol of new
$60 cm^3$ = Vol of new

31) A set of three mixing bowls stack inside of each other and are similar.

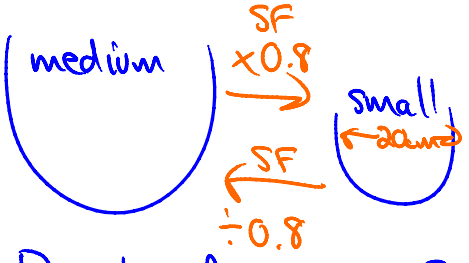
The largest mixing bowl has a volume of 5.0 L and the middle (medium) mixing bowl has a volume of 2.56 L. The smallest mixing bowl has a diameter of 20 cm.

a) Determine the scale factor used for making the second largest mixing bowl from the largest mixing bowl.



Volume of large $\times (SF)^3$ = vol of medium.
$5.0 \times (SF)^3 = 2.56$
$\frac{5.0}{5.0} \quad \frac{2.56}{5.0}$
$\sqrt[3]{(SF)^3} = \sqrt[3]{0.512}$
$SF = 0.8$

32) Determine the diameter of the middle (medium) mixing bowl.



Diameter of medium = $20 \div 0.8 = 25$ cm