

# 26. [Units of Measurement / Time]

## Skill 26.1 Converting customary units of length.

MMBlue 1 1 2 2 3 3 4 4  
MMGreen 1 1 2 2 3 3 4 4

- Use these conversion factors for customary units of length.

$$1 \text{ mi} = 1760 \text{ yd} = 5280 \text{ ft}$$

$$1 \text{ yd} = 3 \text{ ft} = 36 \text{ in.}$$

$$1 \text{ ft} = 12 \text{ in.}$$

To change from **smaller** units to **larger** units

- Divide by the conversion factor (because you need less).

Example: To change inches to feet  $\div$  by 12

To change from **larger** units to **smaller** units

- Multiply by the conversion factor (because you need more).

Example: To change feet to inches  $\times$  by 12

**Q.**  $26 \text{ ft} = \boxed{\phantom{00}} \text{ yd } \boxed{\phantom{00}} \text{ ft}$

**A.**  $26 \text{ ft} = 26 \div 3 \text{ yd}$  ft to yd:  $\div 3$   
 $= 8 \text{ yd and } 2 \text{ ft remaining}$   
 $= 8 \text{ yd } 2 \text{ ft}$

**a)**  $3 \text{ feet} = \boxed{36} \text{ inches}$

$3 \times 12 = 36$  ft to in.:  $\times 12$

**b)**  $9 \text{ yards} = \boxed{\phantom{00}} \text{ feet}$

yd to ft:  $\times 3$

**c)**  $144 \text{ in.} = \boxed{\phantom{00}} \text{ ft}$

**d)**  $2 \text{ yd} = \boxed{\phantom{00}} \text{ in.}$

**e)**  $33 \text{ ft} = \boxed{\phantom{00}} \text{ yd}$

**f)**  $72 \text{ in.} = \boxed{\phantom{00}} \text{ yd}$

**g)**  $120 \text{ in.} = \boxed{\phantom{00}} \text{ ft}$

**h)**  $60 \text{ ft} = \boxed{\phantom{00}} \text{ yd}$

**i)**  $27 \text{ in.} = \boxed{\phantom{00}} \text{ ft } \boxed{\phantom{00}} \text{ in.}$

**j)**  $10 \text{ ft} = \boxed{\phantom{00}} \text{ yd } \boxed{\phantom{00}} \text{ ft}$

**k)**  $4 \text{ ft } 9 \text{ in.} = \boxed{\phantom{00}} \text{ in.}$

**l)**  $5 \text{ yd } 1 \text{ ft} = \boxed{\phantom{00}} \text{ ft}$

## Skill 26.2 Converting metric units of length.

- Use these conversion factors for metric units of length.

$$1 \text{ km} = 1000 \text{ m} = 100,000 \text{ cm} = 1,000,000 \text{ mm}$$

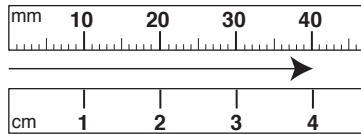
$$1 \text{ m} = 100 \text{ cm} = 1000 \text{ mm}$$

$$1 \text{ cm} = 10 \text{ mm}$$

To change from **smaller** units to **larger** units

- Divide by the conversion factor (because you need less).

Example: To change  
mm to cm  
÷ by 10



To change from **larger** units to **smaller** units

- Multiply by the conversion factor (because you need more).

Example: To change  
cm to mm  
× by 10

Q.  $3800 \text{ cm} = \boxed{\phantom{000}} \text{ m}$

A.  $3800 \text{ cm} = 3800 \div 100 \text{ m}$  *cm to m: ÷ 100*  
 $= 38 \text{ m}$

a)  $24 \text{ cm} = \boxed{240} \text{ mm}$

*cm to mm: × 10*

$24 \times 10 = 240$

b)  $120 \text{ mm} = \boxed{\phantom{00}} \text{ cm}$

*mm to cm: ÷ 10*

c)  $130 \text{ cm} = \boxed{\phantom{000}} \text{ mm}$

d)  $270 \text{ cm} = \boxed{\phantom{000}} \text{ m}$

e)  $7000 \text{ m} = \boxed{\phantom{000}} \text{ km}$

f)  $6.4 \text{ m} = \boxed{\phantom{000}} \text{ cm}$

g)  $19 \text{ m} = \boxed{\phantom{000}} \text{ mm}$

h)  $50 \text{ mm} = \boxed{\phantom{000}} \text{ cm}$

i)  $0.2 \text{ km} = \boxed{\phantom{000}} \text{ cm}$

j)  $500 \text{ mm} = \boxed{\phantom{000}} \text{ m}$

k)  $450 \text{ cm} = \boxed{\phantom{000}} \text{ m}$

l)  $5.1 \text{ m} = \boxed{\phantom{000}} \text{ mm}$

### Skill 26.3 Converting customary units of mass.

- Use these conversion factors for customary units of mass.

$$1 \text{ ton} = 2000 \text{ lb} = 32,000 \text{ oz}$$

$$1 \text{ lb} = 16 \text{ oz}$$

To change from **smaller** units to **larger** units

- Divide by the conversion factor (because you need less).

Example: To change oz to lb  $\div$  by 16

To change from **larger** units to **smaller** units

- Multiply by the conversion factor (because you need more).

Example: To change lb to oz  $\times$  by 16

**Q.**  $2 \text{ lb } 12 \text{ oz} = \boxed{\phantom{000}} \text{ oz}$

**A.**  $2 \text{ lb } 12 \text{ oz} = 2 \times 16 \text{ oz} + 12 \text{ oz}$  *lb to oz:  $\times 16$*   
 $= 32 \text{ oz} + 12 \text{ oz}$   
 $= 44 \text{ oz}$

**a)**  $4 \text{ tons} = \boxed{8000} \text{ pounds}$

$4 \times 2000 = 8000$  *T to lb:  $\times 2000$*

**b)**  $3 \text{ pounds} = \boxed{\phantom{000}} \text{ ounces}$

*lb to oz:  $\times 16$*

**c)**  $160 \text{ oz} = \boxed{\phantom{000}} \text{ lb}$

**d)**  $12,000 \text{ lb} = \boxed{\phantom{000}} \text{ T}$

**e)**  $4.5 \text{ T} = \boxed{\phantom{000}} \text{ lb}$

**f)**  $96 \text{ oz} = \boxed{\phantom{000}} \text{ lb}$

**g)**  $5 \text{ lb} = \boxed{\phantom{000}} \text{ oz}$

**h)**  $3.5 \text{ T} = \boxed{\phantom{000}} \text{ lb}$

**i)**  $5500 \text{ lb} = \boxed{\phantom{000}} \text{ T } \boxed{\phantom{000}} \text{ lb}$

**j)**  $53 \text{ oz} = \boxed{\phantom{000}} \text{ lb } \boxed{\phantom{000}} \text{ oz}$

**k)**  $1 \text{ lb } 10 \text{ oz} = \boxed{\phantom{000}} \text{ oz}$

**l)**  $3 \text{ T } 500 \text{ lb} = \boxed{\phantom{000}} \text{ lb}$

## Skill 26.4 Converting metric units of mass.

MMBlue 1 1 2 3 3 4 4  
MMGreen 1 1 2 2 3 3 4 4

- Use these conversion factors for metric units of mass.

$$1 \text{ tonne} = 1000 \text{ kg} = 1,000,000 \text{ g}$$

$$1 \text{ kg} = 1000 \text{ g}$$

To change from **smaller** units to **larger** units

- Divide by the conversion factor (because you need less).

Example: To change g to kg  $\div$  by 1000

To change from **larger** units to **smaller** units

- Multiply by the conversion factor (because you need more).

Example: To change kg to g  $\times$  by 1000

Q.  $30 \text{ g} = \boxed{\phantom{000}} \text{ kg}$

A.  $30 \text{ g} = 30 \div 1000 \text{ kg}$  *g to kg:  $\div$  1000*  
 $= 0.\overline{030}$  *3 zeros, 3 places to the left*  
 $= 0.03 \text{ kg}$

a)  $8 \text{ kg} = \boxed{8000} \text{ g}$  *kg to g:  $\times$  1000*  
*3 zeros, 3 places to the right*  
 $8 \times 1000 = 8000$

b)  $9000 \text{ g} = \boxed{\phantom{000}} \text{ kg}$  *g to kg:  $\div$  1000*

c)  $260 \text{ g} = \boxed{\phantom{000}} \text{ kg}$

d)  $3.4 \text{ kg} = \boxed{\phantom{000}} \text{ g}$

e)  $510 \text{ g} = \boxed{\phantom{000}} \text{ kg}$

f)  $700 \text{ g} = \boxed{\phantom{000}} \text{ kg}$

g)  $25.9 \text{ kg} = \boxed{\phantom{000}} \text{ g}$

h)  $0.9 \text{ kg} = \boxed{\phantom{000}} \text{ g}$

i)  $80 \text{ g} = \boxed{\phantom{000}} \text{ kg}$

j)  $0.65 \text{ t} = \boxed{\phantom{000}} \text{ kg}$

k)  $3800 \text{ kg} = \boxed{\phantom{000}} \text{ t}$

l)  $12.5 \text{ t} = \boxed{\phantom{000}} \text{ kg}$

## Skill 26.5 Converting customary units of capacity.

- Use these conversion factors for customary units of capacity.

$$\begin{aligned} 1 \text{ gal} &= 4 \text{ qt} = 8 \text{ pt} = 16 \text{ c} = 128 \text{ fl oz} \\ 1 \text{ qt} &= 2 \text{ pt} = 4 \text{ c} = 32 \text{ fl oz} \\ 1 \text{ pt} &= 2 \text{ c} = 16 \text{ fl oz} \\ 1 \text{ c} &= 8 \text{ fl oz} \end{aligned}$$

To change from **smaller** units to **larger** units

- Divide by the conversion factor (because you need less).

Example: To change fl oz to cups  $\div$  by 8

To change from **larger** units to **smaller** units

- Multiply by the conversion factor (because you need more).

Example: To change qt to pt  $\times$  by 2

**Q.** 15 qt 1 pt =  pt

**A.**  $15 \text{ qt } 1 \text{ pt} = 15 \times 2 \text{ pt} + 1 \text{ pt}$  qt to pt:  $\times 2$   
 $= 30 \text{ pt} + 1 \text{ pt}$   
 $= 31 \text{ pt}$

**a)** 6 gal =  pt gal to qt:  $\times 4$   
qt to pt:  $\times 2$   
 $6 \times 4 \times 2 = 24 \times 2 = 48$

**b)** 13 qt =  pt qt to pt:  $\times 2$

**c)** 24 pt =  qt

**d)** 16 pt =  gal

**e)** 5 gal =  qt

**f)** 4 gal =  pt

**g)** 180 pt =  qt

**h)** 60 qt =  gal

**i)** 31 qt =  gal  qt

**j)** 13 pt =  qt  pt

**k)** 3 gal 5 pt =  pt

**l)** 4 gal 2 qt =  qt

## Skill 26.6 Converting metric units of capacity.

MMBlue 1 1 2 2 3 4 4  
MMGreen 1 1 2 2 3 3 4 4

- Use these conversion factors for metric units of capacity.

$$1 \text{ kL} = 1000 \text{ L} = 1,000,000 \text{ mL}$$

$$1 \text{ L} = 1000 \text{ mL or } 1000 \text{ cm}^3$$

To change from **smaller** units to **larger** units

- Divide by the conversion factor (because you need less).

Example: To change mL to L  $\div$  by 1000

To change from **larger** units to **smaller** units

- Multiply by the conversion factor (because you need more).

Example: To change kL to L  $\times$  by 1000

Q.  $750 \text{ mL} = \boxed{\phantom{000}} \text{ L}$

A.  $750 \text{ mL} = 750 \div 1000 \text{ L}$  mL to L:  $\div$  1000  
 $= 0.\overline{750}$  3 zeros, 3 places to the left  
 $= 0.75 \text{ L}$

a)  $3.7 \text{ L} = \boxed{3700} \text{ mL}$  L to mL:  $\times$  1000  
 $3.7 \times 1000 = 3700$

b)  $6 \text{ L} = \boxed{\phantom{000}} \text{ mL}$  L to mL:  $\times$  1000

c)  $22 \text{ L} = \boxed{\phantom{000}} \text{ mL}$

d)  $8000 \text{ mL} = \boxed{\phantom{000}} \text{ L}$

e)  $250 \text{ mL} = \boxed{\phantom{000}} \text{ L}$

f)  $9.4 \text{ L} = \boxed{\phantom{000}} \text{ mL}$

g)  $0.5 \text{ L} = \boxed{\phantom{000}} \text{ mL}$

h)  $1.25 \text{ L} = \boxed{\phantom{000}} \text{ mL}$

i)  $30,000 \text{ mL} = \boxed{\phantom{000}} \text{ L}$

j)  $15.3 \text{ L} = \boxed{\phantom{000}} \text{ mL}$

k)  $40 \text{ L} = \boxed{\phantom{000}} \text{ mL}$

l)  $500 \text{ mL} = \boxed{\phantom{000}} \text{ L}$

## Skill 26.7 Converting units of time.

MMBlue 11 22 33 44  
MMGreen 11 22 33 44

- Use these conversion factors for units of time.

$$\begin{array}{rcl}
 1 \text{ week} & = & 7 \text{ days} = 168 \text{ h} = 10,080 \text{ min} = 604,800 \text{ s} \\
 1 \text{ day} & = & 24 \text{ h} = 1440 \text{ min} = 86,400 \text{ s} \\
 1 \text{ h} & = & 60 \text{ min} = 3600 \text{ s} \\
 1 \text{ min} & = & 60 \text{ s}
 \end{array}$$

To change from **smaller** units to **larger** units

- Divide by the conversion factor (because you need less).

Example: To change s to min  $\div$  by 60

To change from **larger** units to **smaller** units

- Multiply by the conversion factor (because you need more).

Example: To change h to min  $\times$  by 60

**Q.** 1 week, 6 days =  h

**A.** *1 week 6 days* =  $1 \times 7 \text{ days} + 6 \text{ days}$  week to days:  $\times 7$   
 = 13 days  
 $13 \text{ days} \times 24 \text{ h} = 312 \text{ h}$  days to h:  $\times 24$

**a)**  $2 \frac{1}{3} \text{ day} =$   h day to h:  $\times 24$

$$2 \times 24 + \frac{1}{3} \times 24 = 48 + 8 = 56$$

**b)** 5 hours =  minutes h to min:  $\times 60$

**c)** 4 minutes =  seconds

**d)** 180 s =  min

**e)**  $\frac{3}{4} \text{ day} =$   h

**f)**  $2 \frac{1}{2} \text{ h} =$   min

**g)**  $1 \frac{1}{4} \text{ h} =$   min

**h)** 200 min =  h  min

**i)** 144 min =  h  min

**j)** 5 min 30 s =  s

**k)** 3 week, 5 days =  days

**l)** 4 h 40 min =  min

**Skill 26.8** Finding the elapsed time between two events.

- Calculate the time until the next closest hour.  
A.M. to P.M.
- Add the time to midday.
- Then add the remaining time.

- P.M. to A.M.
- Add the time to midnight.
- Then add the remaining time.

**Q.** School starts at 8:50 A.M. and ends at 2:30 P.M. How long is a school day in hours and minutes?

**A.**  $8:50$  to  $9:00 = 10$  min  
 $9:00$  to  $12:00 = 3$  h  
 $12:00$  to  $2:30 = 2$  h 30 min  
 $10$  min +  $3$  h +  $2$  h +  $30$  min  
 = **5 h 40 min**

**a)** Find the time in hours and minutes between 8:30 A.M. and 3:00 P.M. the same day.

$8:30$  to  $9:00 = 30$  min,  $9:00$  to  $12:00 = 3$  h

$12:00$  to  $3:00 = 3$  h

$30$  min +  $3$  h +  $3$  h  $\Rightarrow$

**b)** The movie begins at 3:15 P.M. and ends at 5:00 P.M. How long is the movie in hours and minutes?

.....

.....

$\Rightarrow$

**c)** Mom started cooking at 6:20 P.M. and finished at 7:35 P.M. How long did she cook in hours and minutes?

.....

.....

$\Rightarrow$

**d)** Find the time in hours and minutes between 6:30 P.M. and 2:10 A.M. the next day.

.....

.....

$\Rightarrow$

**e)** Find the time in hours and minutes between 4:00 A.M. and 2:25 P.M. the same day.

.....

.....

$\Rightarrow$

**f)** Find the time in hours and minutes between 09:10 and 16:20 the same day.

.....

.....

$\Rightarrow$