Unit 3 – Linear measurement

Instructions:
Using a pencil, complete the following questions as you work through the related lessons. Show ALL work as it is explained in the lessons. Do your best and ask your teacher if you do not understand any question. Remember you can use the data file for questions in the assignment and on the quizzes.

Lesson 1 Comparing systems of Measurement

1. Estimate each measure using an imperial unit.
   a) the height of a mouse _______________________
   b) the length of a pencil ________________________
   c) the width of your classroom ____________________
   d) the height of your school ______________________
   e) the length of a hockey stick ___________________
   f) the length of a basketball court __________________

2. Convert each of the following Imperial Units from decimals into fractions.
   a) 12.4 inches
   b) 6.75 yards

3. Convert each of the following Imperial Units from fractions into decimals. Answer to the nearest hundredth.
   a) $\frac{5}{16}$ inches
   b) $\frac{3}{8}$ feet
4. Which imperial unit would be used to measure each of the following:

   a) The length of string needed to fly a kite
   __________________________

   b) The width of a whiteboard
   __________________________

   c) The length of your finger
   __________________________

   d) A weight of a loaf of bread
   __________________________

   e) Water in a big fish tank
   __________________________

   f) The height of an office tower
   __________________________

   g) Width of a stop sign
   __________________________

   h) The diameter of the Earth
   __________________________

5. Perform the following conversions: Show all work.

   a) 10560 ft = ____ mi
   b) 8800 yd = ____ mi
   c) 60 in=____ ft

   d) 36 ft=____ yd
   e) 4 ft=____ in
   f) 2 yd=____ ft

6. Convert each of the following Imperial Units written in fraction from into the indicated units as decimals. Answer to two decimal places.

   a) 2600 feet to miles
   b) \( \frac{7}{8} \) yards to inches
7. Anna is tying ribbon around 100 wedding invitation cards. Each card is 3.5 inches wide. She needs 7 inches per card. The ribbon comes in rolls that are 4 feet 1 inch long. How many rolls of ribbon does she need?

8. What is the total thickness of a wall made from \( \frac{5}{8} \) in thick drywall nailed to a \( \frac{3}{4} \) in stud over a \( 3 \frac{1}{2} \) in thick insulation? (answer in fraction form)

9. A jack raises a truck \( \frac{3}{16} \) inch for each stroke of the lever. How many strokes are needed to raise a truck \( 1 \frac{3}{4} \) inches?

10. The dimensions of a door are 8 feet by 36 inches. Express the dimensions in yards. Write answer in fraction form.

11. Convert each of the following metric measurements.
   a) 75 mm to cm
   b) 2.1 km to m

   \( 7.5 \text{ cm} \)
Lesson 2 Converting between Measurement Systems

12. a) 16 “ = __________ cm  
    b) 6 km = __________ mi  

c) 1.2 m = ___________ ft  
    d) 37 cm = __________ in  

e) 250 mm = __________ in  
    f) 17 ft = _______________ m  

g) 42 mi = _______________ km  
    h) 12 yd = _______________ m  

i) 23 in = _______________ mm  
    j) 6.75 km = _______________ mi
13. Julia needs to cut a 15 m rope into 20 equal pieces. Calculate the length of each piece in cm

14. Nick is a distance runner. He ran a mile race in Seattle Washington in a time of 4 minutes and 2 seconds. Two weeks later at a meet in Vancouver he ran a 1500 m race in a time of 3 minutes and 59 seconds. In which race was his average speed the fastest and by how much? (convert to feet per second)
Lesson 3 Calculating Surface Area of 2D Shapes

15. Find the area of the following:
   a) 
   
   \[
   \text{Area = } 10 \text{ cm} \times 6 \text{ cm} = 60 \text{ cm}^2
   \]

   b) 
   
   \[
   \text{Area = } 4 \text{ ft} \times 2 \text{ ft} = 8 \text{ ft}^2
   \]

   c) 
   
   \[
   \text{Area = } \frac{1}{2} \times 4 \text{ cm} \times 7 \text{ cm} = 14 \text{ cm}^2
   \]

   d) 
   
   \[
   \text{Area = } \frac{1}{2} \times 5 \text{ cm} \times 8 \text{ cm} = 20 \text{ cm}^2
   \]

   e) 
   
   \[
   \text{Area = } \pi \times \left( \frac{12 \text{ cm}}{2} \right)^2 = 36\pi \text{ cm}^2
   \]
16. Calculate the area of the following irregular shapes

a)

[Diagram of a triangle with sides 8, 12, and 14]

b)

[Diagram of a rectangle with sides 10 mm and 14 mm, and a semicircle on top]

c)

[Diagram of a shape with a rectangle on top and bottom, and a triangle in the middle]

17. A garden is designed with a rectangular part in the middle with two semi-circles on the ends. The dimensions of the rectangular portion are 18.4 feet long and 8.6 feet wide. What is the area of the garden?
18. The area of the diagram below is $43\frac{3}{4}$ square feet. What is the width in inches?

![Diagram](image)

19. A Horse is tied with rope in the center of grassland to graze. The length of rope is 5m. The diameter of circular garden is 50m. Find the area in which the horse cannot graze.

Lesson 4 Calculating Surface Area of 3D Shapes

20. Calculate the surface area of the following 3-D objects. Use $\pi$ on your calculator for all calculations. Answer to the nearest 100th.

   a) ![Diagram](image)
b) \[ \text{diameter} = 15 \text{ cm} \]

\[
\text{30 cm}
\]

\[9 \text{ m}\]

\[9 \text{ m}\]

\[14.4 \text{ m}\]

c) 

d) 

\[\text{37 in}\]

\[54 \text{ in}\]

d) 

e) 

\[\text{Diameter} = 15 \text{ in.}\]

\[\text{Centre}\]

f) 

\[5 \text{ m}\]

\[8 \text{ m}\]
21. A gymnasium is 45 ft long, 30 ft wide, and 14 ft high. The school is painting the four walls and the ceiling of the gym. How much does it cost to paint the room if the paint costs $8 a gallon and each gallon covers 300 ft of wall.

22. The figure shows a section of a metal pipe. Given the internal radius of the pipe is 2 cm, the external radius is 2.4 cm and the length of the pipe is 10 cm. Find the total surface area of the pipe.

![Diagram of a section of a metal pipe with internal radius 2 cm, external radius 2.4 cm, and length 10 cm.]

Lesson 5 Volume

23. How many British gallons are equivalent to 35 US Gallons?

24. Bonnie’s truck uses 8.9 L of gas for 100 km of city driving and 7.2 L for 100 km of highway driving. How many US gallons would the truck use in each case if she drove 50 km in the city and 250 km on the highway?
25. Ed has a garden box he would like to fill with potting soil. The dimensions of the box are 5 yards long by 2 yards wide and 8 inches deep. A store sells potting soil in bags where each bag contains one cubic foot of soil. How many bags does Ed need to purchase?

26. What is the volume of a regular cylinder whose base has radius of 7 cm and has height of 2 cm?

27. A concrete truck arrives at a job site holding 7.8 cubic yards of concrete. If the patio being constructed is 18 feet across and 4 inches thick, how long, to the nearest foot, will the patio be if constructed from the amount of concrete on the truck?
Answers:
1. a) 3 inches  
    b) 6 inches  
    c) 12 yards  
    d) 8 yards  
    e) 60 inches  
    f) 100 feet  
2. a) 12 2/5”  
    b) 6 ¾ yds  
3. a) 9.31”  
    b) 5.38’  
4. a) yards  
    b) feet  
    c) inches  
    d) ounces  
    e) fluid ounces  
    f) yards  
    g) inches  
    h) miles  
5. a) 2  
    b) 5  
    c) 5  
    d) 12  
    e) 48  
    f) 6  
6. a) 0.49 mi  
    b) 211.5 in  
7. 15 rolls  
8. 4 7/8”  
9. 9 1/3”  
10. 2 2/3 yd x 1 yd  
11. a) 7.5 cm  
    b) 2100 m  
    c) 400 mm  
    d) 0.375 km  
12. a) 40.64  
    b) 3.73  
    c) 3.94  
    d) 14.6  
    e) 9.85  
    f) 5.18  
    g) 67.6  
    h) 10.98  
    i) 584.2  
    j) 4.2  
    k) 365.76  
    l) 4.1  
    m) 0.53  
    n) 8046.5  
13. 75 cm  
14. Seattle Race by 1.24 ft/s  
15. a) 60 sq. cm  
    b) 8 sq ft  
    c) 14 sq cm  
    d) 20 sq cm  
    e) 113.1 sq cm  
16. a) 140 sq units  
    b) 217 sq mm  
    c) 60 sq cm  
17. 216.33 sq ft  
18. 30 inches
20. a) 62 sq cm  b) 1767.15 sq cm  c) 340.2 sq m  d) 10577.74 sq in  e) 708.86 sq in  
f) 486.95 sq m
21. $96
22. 287.56 sq cm
23. 29.17 Bg
24. city driving 1.17 US Gallon  highway driving 4.68 US Gallons
25. 60 bags
26. 307.88 cu cm
27. 35 ft