

REVIEW SHEETS

BASIC MATHEMATICS

MATH 020

A Summary of Concepts Needed to be Successful in Mathematics

The following sheets list the key concepts that are taught in the specified math course. The sheets present concepts in the order they are taught and give examples of their use.

WHY THESE SHEETS ARE USEFUL –

- To help refresh your memory on old math skills you may have forgotten.
- To prepare for math placement test.
- To help you decide which math course is best for you.

HOW TO USE THESE SHEETS –

- Students who successfully review spend from four to five hours on this material. We recommend that you cover up the solutions to the examples and try working the problems one by one. Then check your work by looking at the solution steps and the answer. **Note: Calculators will only pop up on the test for selected problems, so you should practice without using one.**

KEEP IN MIND –

- These sheets are not intended to be a short course. You should use them simply to help you determine at what skill level in math you should begin study. For many people, the key to success and enjoyment of learning math is in getting started at the right place. You will most likely be more satisfied and comfortable if you start onto the path of math and science by selecting the appropriate beginning stepping stone.

I. Ratio, rate, proportion and average – Know how to

- write a ratio in four ways;
- set up and simplify problems involving ratios and rates;
- solve a proportion for the variable;
- set up and solve a proportion application to answer a question; and
- find the average of a set of numbers.

1. Write the ratio of 2 to 3 in four ways.
2. If there are 2 doctors for every 125 people in a certain town, what is the ratio of doctors to people? What is the ratio of people to doctors?
3. If a car can travel 120 miles on 3 gallons of gas, what is its mileage in miles per gallon?
4. If 7 dozen eggs cost \$4.41, what is the cost in dollars per dozen?
5. If an 8-foot wood post weighs 35.3 lb, what is the weight in pounds per foot?
6. Solve each proportion for x .

a. $\frac{3}{6} = \frac{x}{8}$

b. $\frac{3}{2} = \frac{1}{x}$

c. $\frac{5}{x} = \frac{2}{3}$

d. $\frac{x}{4.2} = \frac{9.6}{5}$

For #7 – 10, set up a proportion and solve to answer the questions.

7. If 3 inches on a map represents 100 miles, how many inches on the map represents 40 miles?
8. If a can of paint covers 320 sq. ft., how many cans (whole cans) are needed to cover 1650 sq. ft.?
9. Two pounds (lbs) of butter will make 5 batches of cookies. How many pounds of butter will make 2 batches of cookies?
10. Find the average of 92, 63, 77 and 89.
11. Find the average of 3.2, 1.7, 2.3, 3.5 and 2.9.

III. Geometry – Know how to

- find perimeter and area of four-sided figures including rectangles, parallelograms and trapezoids;
- find area of triangles;
- find circumference and area of circles; and
- solve application problems involving area.
- find square roots.

Geometric Formulas

Perimeter

Rectangle: $P = 2l + 2w$, where l = length and w = width

Square (a rectangle with sides of equal length): $P = 4s$, s = length of each side

Other closed figures: Sum of the lengths of the sides

Circumference

Circle: $C = \pi d$ or $C = 2\pi r$ where d = diameter, r = radius, $\pi \approx 3.14$

Area

Rectangle: $A = lw$

Square: $A = s^2$

Parallelogram: $A = bh$

Trapezoid: $A = \frac{1}{2}h(b_1 + b_2)$, where h = height (distance between parallel sides); b_1 and b_2 = lengths of parallel sides

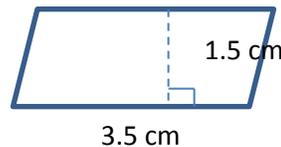
Triangle: $A = \frac{bh}{2}$, where b = base and h = height

Circle: $A = \pi r^2$

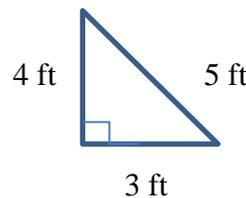
22. What is the perimeter and area of a square that is 3 inches on each side?

23. What are the perimeter and area of a rectangle that is 13 cm by 6 cm?

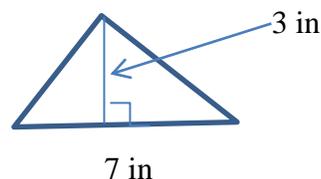
24. What is the area of the parallelogram shown?



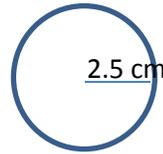
25. Find the area of this triangle.



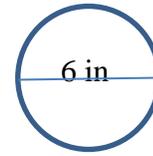
26. Find the area of this triangle.



27. Find the circumference and area of this circle.
(Use 3.14 for π .)

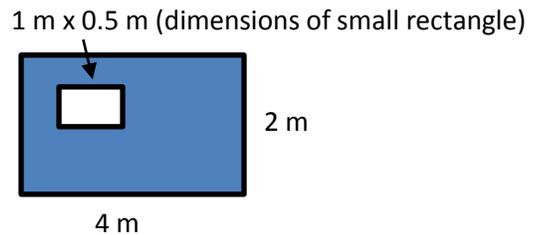


28. Find the circumference and area of this circle.
(Use 3.14 for π .)



29. A baseball diamond is a square, 90 feet on each side. What is the area of a baseball diamond?

30. Find the area of the shaded region.



31. Find each square root:

a. $\sqrt{25}$

b. $\sqrt{81}$

IV. Algebra – Know how to

- solve one step equations of the forms $x + a = b$ and $ax = b$ for x , where a and b are whole numbers, fractions or decimals.

32. Solve for x in each equation:

a. $x + 8 = 15$

b. $3 \cdot x = 2.7$

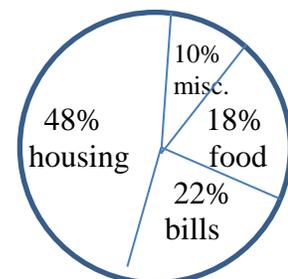
c. $x + \frac{1}{4} = \frac{3}{4}$

V. Graphs – You should have the following skills

- Read a circle graph.

33. Use this circle graph of a family's expenses to answer these questions:

- If the family makes \$33,500 per year, how much is spent for food?
- What percent of the family income is spent on miscellaneous and bills?



VI. Measurement – Know how to

- convert a measurement from one unit to another within the USA system for length, capacity and weight using multiplication by 1;
- convert a measurement from one unit to another within the metric system for length, capacity and mass using decimal point movement or multiplication by 1; and
- convert a measurement of length between USA and metric systems using multiplication by 1.

Note: Unit conversion skills are not be evaluated on the placement test. However, in courses with a MTH 020 prerequisite, knowledge of unit conversion skills is assumed.

Measurement Equivalences

USA Units

Length: 12 in = 1 ft 3 ft = 1 yd 5280 ft = 1 mi

Weight: 16 oz = 1 lb 2000 lb = 1 ton

Capacity: 8 fl oz = 1 c. 2 c. = 1 pt 2 pt = 1 qt 4 qt = 1 gal

Metric Units

Length: 10 mm = 1 cm 10 cm = 1 dm 10 dm = 1 m 10 m = 1 dam 10 dam = 1 hm

10 hm = 1 km

Mass: 10 mg = 1 cg 10 cg = 1 dg 10 dg = 1 g 10 g = 1 dag 10 dag = 1 hg 10 hg = 1 kg

Capacity: 10 mL = 1 cL 10 cL = 1 dL 10 dL = 1 L 10 L = 1 daL 10 daL = 1 hL

10 hL = 1 kL

Metric Conversion Chart

km	hm	dam	m	dm	cm	mm
kg	hg	dag	g	dg	cg	mg
kL	hL	daL	L	dL	cL	mL

USA ↔ Metric

Length: 1 in = 2.54 cm 1 ft = 0.305 m 1 yd = 0.914 m 1 mi = 1.609 km

34. Convert the units to fill in the blanks.

a. 5 ft = _____ in b. 72 fl oz = _____ pt c. 3 lb = _____ oz

35. Convert the units to fill in the blanks.

a. 2.5m = _____ cm b. 8 L = _____ kL c. 9 g = _____ mg

36. Convert the units to fill in the blanks.

a. 12.7 cm = _____ in b. 1400 m = _____ mi

Math 020 Review Answers

1. 2 to 3; $2:3$; $\frac{2}{3}$; $2 \div 3$

3. $\frac{120 \text{ mi}}{3 \text{ gal}} = \frac{40 \text{ mi}}{1 \text{ gal}} = 40 \text{ mpg}$

5. $\frac{35.3 \text{ lb}}{8 \text{ ft}} = \frac{4.475 \text{ lb}}{1 \text{ ft}} = 4.475 \text{ lb/ft}$

6b. $3x = 2$
 $x = \frac{2}{3}$ or $0.\bar{6}$

6d. $5x = 40.32$
 $x = 8.064$

8. $\frac{1}{320} = \frac{x}{1650}$
 $x = 5.15625$; 6 cans

10. $\frac{92+63+77+89}{4} = 80.25$

12a. $30\% = .30$

12c. $12\frac{1}{2}\% = 12.5\% = 0.125$

13b. $0.016 = 1.6\%$

14a. $6\% = \frac{6}{100} = \frac{3}{50}$

14c. $25\frac{1}{2}\% = 25.5\% = 0.255 = \frac{255}{1000} = \frac{51}{200}$

15b. $1\frac{1}{4}\% = 1.25\% = 125\%$

16. $14 = p \cdot 35$
 $p = 0.4 = 40\%$

18. $42 = .43x$
 $x \approx 97.7$

20. $8 = p \cdot 64$
 $p = .125 = 12.5\%$;
12.5% of the items are defective.

2. $\frac{2}{125} = \frac{125}{2}$

4. $\frac{\$4.41}{7 \text{ doz}} = \frac{\$0.63}{1 \text{ doz}} = \$0.63 \text{ per dozen}$

6a. $6x = 24$
 $x = 4$

6c. $2x = 15$
 $x = \frac{15}{2}$ or 7.5

7. $\frac{3}{100} = \frac{x}{40}$ so
 $100x = 120$
 $x = 1.2$; 1.2 in or $1\frac{1}{5}$ in

9. $\frac{2}{5} = \frac{x}{2}$
 $x = \frac{4}{5}$; $\frac{4}{5}$ lb

11. $\frac{3.2+1.7+2.3+3.5+2.9}{5} = 2.72$

12b. $3.92\% = .0392$

13a. $0.42 = 42\%$

13c. $41.6 = 4160\%$

14b. $80\% = \frac{80}{100} = \frac{4}{5}$

15a. $\frac{2}{5} = 0.4 = 40\%$

15c. $\frac{1}{3} = 0.33\bar{3} = 33.\bar{3}\%$

17. $x = .12(52)$
 $x = 6.24$

19. $x = .3(280)$
 $x = 84$; 84 students can type.

21. $\frac{9.5}{x} = \frac{5.5}{100}$ or $9.5 = .055x$
 $x \approx 172.73$;
The original cost of the ring was \$172.73.

22. $P = 4 \cdot 3$ $A = 3 \cdot 3$
 $P = 12$; Perimeter: 12 in $A = 9$; Area: 9 sq in
23. $P = 2 \cdot 13 + 2 \cdot 6$ $A = 13 \cdot 6$
 $P = 38$; Perimeter: 38 cm $A = 78$; Area: 78 sq cm
24. $A = 3.5 (1.5) = 5.25$; Area: 5.25 sq cm
25. $A = \frac{1}{2} \cdot 3 \cdot 4$
 $A = 6$; Area: 6 sq ft
26. $A = \frac{1}{2} \cdot 7 \cdot 3$
 $A = \frac{21}{2}$ or $10\frac{1}{2}$ or 10.5; Area: $10\frac{1}{2}$ sq in
27. $C \approx 2(3.14)(2.5)$ $A \approx 3.14(2.5)^2$
 $C \approx 15.7$; Circumerence: about 15.7 cm $A \approx 19.625$; Area: about 19.625 sq cm
28. $C \approx 3.14(6)$ $A \approx 3.14(3)^2$
 $C \approx 18.84$; Circumference: about 18.84 in $A \approx 28.26$; Area: 28.26 sq in
29. $A = 90 \cdot 90$
 $= 8100$; Area of Baseball Diamond: 8100 sq ft
30. $A = 4(2) - 1(.5)$
 $A=7.5$ sq m
- 31a. $\sqrt{25} = 5$ 31b. $\sqrt{81} = 9$
- 32a. $x = 7$ 32b. $x = .9$ 32c. $x = \frac{1}{2}$
- 33a. $x =$ Amount spent on food (\$)
 $x = .18(33,500)$
 $x = 6,030$; \$6,030 is spent on food.
- 33b. $10\% + 22\% = 32\%$; 32% is of family income is spent on miscellaneous and bills.
- 34a. $\frac{5 \text{ ft}}{1} \cdot \frac{12 \text{ in}}{1 \text{ ft}} = 60 \text{ in}$ 34b. $\frac{72 \text{ fl oz}}{1} \cdot \frac{1 \text{ cup}}{8 \text{ fl oz}} \cdot \frac{1 \text{ pt}}{2 \text{ cups}} = 4.5 \text{ pt}$ 34c. $\frac{3 \text{ lb}}{1} \cdot \frac{16 \text{ oz}}{1 \text{ lb}} = 48 \text{ oz}$
- 35a. 250 cm 35b. 0.008 kL 35c. 9000 mg
- 36 a. $\frac{12.7 \text{ cm}}{1} \cdot \frac{1 \text{ in}}{2.54 \text{ cm}} = 5 \text{ in}$
- 36b. $\frac{1400 \text{ m}}{1} \cdot \frac{1 \text{ ft}}{0.305 \text{ m}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}} \approx .87 \text{ mi}$ Or $\frac{1400 \text{ m}}{1} \cdot \frac{1 \text{ km}}{1000 \text{ m}} \cdot \frac{1 \text{ mi}}{1.609 \text{ km}} \approx .87 \text{ mi}$