Number Bases — Test   Name: _____   Date: _____

1) Convert each octal number into decimal:

a) 72_{oct}

98 dec (circled)

b) 254_{oct}

172 dec (circled)

c) 15364_{oct}

6900 dec (circled)

2) Convert each decimal number into octal:

a) 18_{dec}

22 oct

b) 515_{dec}

1003 oct

c) 1600_{dec}

3100 OCT

3) Write down the next four numbers past each given number:

a) 25_{oct}

26, 27, 30, 31

b) 7376_{oct}

7377, 7400
7401, 7402

4) Convert each number into *standard decimal form*:

a) $6.32 \cdot 10^7$

63,200,000

b) $5.2 \cdot 10^{-3}$

0.0052 (circled)

5) Convert each number into *scientific notation*:

a) 97,000,000

9.7×10^7 (circled)

b) 0.00003283

3.283×10^{-5}

Do the indicated arithmetic.

6)
$$363_{oct}$$
$$+532_{oct}$$
1115 OCT

7)
$$74_{oct}$$
$$-46_{oct}$$
26 OCT

8)
$$64_{oct}$$
$$\times 37_{oct}$$
554
2340
3114 OCT (circled)

9)
$$536_{oct}$$
$$\times 76_{oct}$$
4064
46220
52,304 OCT (circled)

10) Convert:

   a) 1234_{five} into decimal

125
50
15
4
———
194_{dec}

   b) $1A8_{hex}$ into decimal

256
160
+ 8
———
$424\ dec$

11) Convert:

   a) 35_{dec} into binary.

100011_{bin}

   b) 730_{dec} into hexadecimal.

$2DA_{hex}$

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12) Write down the next four numbers past each given number:

   a) 10110_{bin}

10111
11000
11001
11010

   b) $F9E_{hex}$

F9F
FA0
FA1
FA2

Do the indicated arithmetic.

13) 3204_{five}
    $+4322_{five}$
    ———————
    $13031\ five$

14) 10101_{bin}
    $+1011_{bin}$
    ——————
    100000_{bin}

15) $D57_{hex}$
    $-EA_{hex}$
    ———————
    $C6D_{hex}$

16) $5C_{hex}$
    $\times 3B_{hex}$
    ——————
    3F4
    114
    ———————
    1534_{hex}

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17) *Challenge!* Leave your answer as a repeating decimal:
   $4F4A_{hex} \div 5B_{hex}$

$DF.\overline{0E1}$

5B) 4F4A.000
    -49 F
    ————
      55A
    - 555
    ————
       50
     - 0
    ————
      500
    - 4FA
    ————
       60
     - 5B
    ————
       50

Pythagorean Theorem − Test   Name: _____

1) Find X by using any method. Leave answers as square roots.

a)
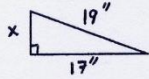
$x^2 = 19^2 - 17^2$
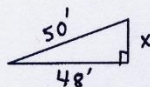
$x^2 = 361 - 289$

$x^2 = 72 = \sqrt{72} \approx 8.49''$

$x = 6\sqrt{2}$

b)

$x = 14ft$

$\div 2$ $\times 2$

25   7
24

or

$x^2 = 50^2 - 48^2$

$x^2 = 2500 - 2304$

$x^2 = 196$

$x = 14$

2) Find X by using a Pythagorean triple. Be sure to show your work.

650m

$\div 10$ $\times 10$

56   33
65

3) Use the square root algorithm to calculate $\sqrt{617}$. Round your answer to 3 significant digits. Go as far as you can for extra credit!   24.8394847

```
  2  | 617.00000000
  2    -4
 4 4   217
   4   -176
48 8   4100
   8   -3904
49 63  19600
   3   -14889
4966 9 471100
     9 -447021
49676 4 2407900
      4 -1987136
```
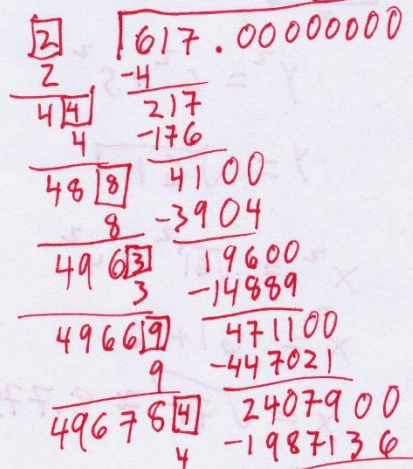
4) Determine whether each triangle is obtuse, right or acute, given its three sides a, b, c.

2 pts

a) $a = 2$; $b = 3$; $c = 4$

$$4^2 \overset{?}{=} 3^2 + 2^2$$
$$16 \overset{?}{=} 9 + 4$$
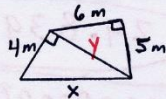$$16 > 13$$

obtuse

b) $a = 11$; $b = 7$; $c = 13$

$$13^2 \overset{?}{=} 11^2 + 7^2$$
$$169 \overset{?}{=} 121 + 49$$
$$169 < 170$$

acute

5) Find X.

$$y^2 = 6^2 + 5^2$$
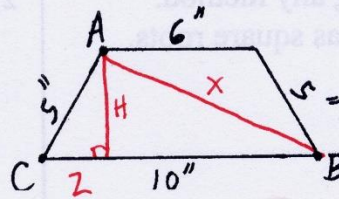$$y = \sqrt{61}$$
$$x^2 = \sqrt{61}^2 + 4^2$$
$$x^2 = 61 + 16$$
$$x = \sqrt{77} \approx 8.775\,m$$

Challenge Problem!

- Given that the angles at B and C are equal, find the distance from A to B.

2 pts

$$H^2 = 5^2 - 2^2$$
$$H^2 = 21$$
$$H = \sqrt{21}$$

$$x^2 = \sqrt{21}^2 + 8^2$$
$$x^2 = 21 + 64$$
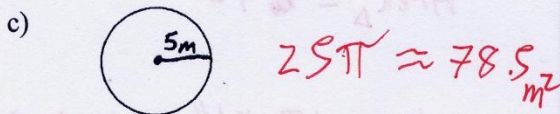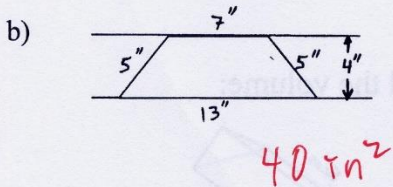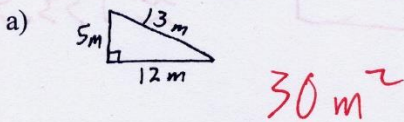$$x = \sqrt{85} \approx 9.22$$

Mensuration – Test   Name:_____

Heron's formula is $A = \sqrt{s(s-a)(s-b)(s-c)}$

All problems on this side are worth 4 points!
Calculators are not allowed. You may leave
answers either as approximate decimals, or
in terms of a square root, or π.
You may use the tables on page 64 of your
workbook, but may not use any notes.

1) Find the area of each one:

a)

5 m, 13 m, 12 m

30 m^2

b)

7″, 5″, 5″, 4″, 13″

40 m^2

c)

5 m

$25\pi \approx 78.5 \text{ m}^2$

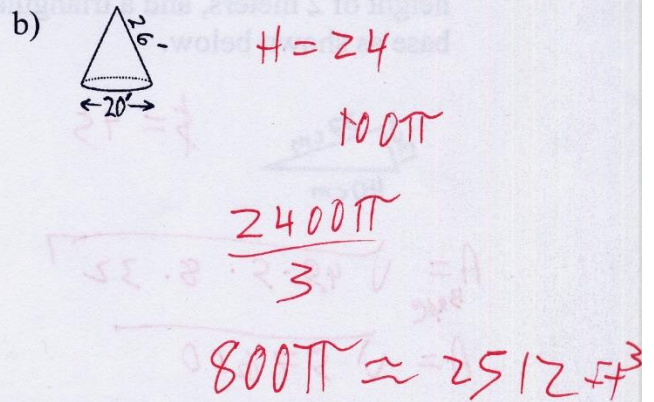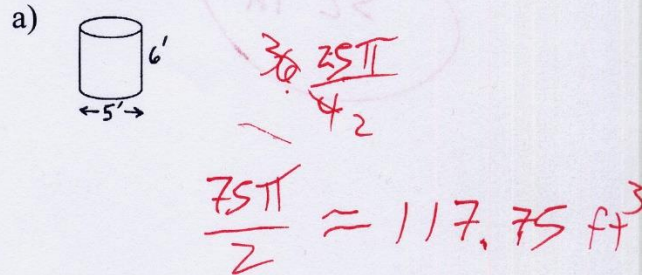2) What is the volume of a sphere with a radius of 3 m.

$\frac{4}{3}\pi \, 3^3$

$36\pi \text{ m}^3 \approx 113$

3) How many in² are in a ft²?

144
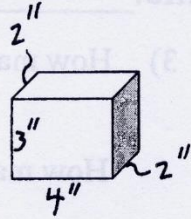
How many in³ are in a ft³?

1728

4) Find the volume of…

a)

6′, ←5′→

$36. \frac{25\pi}{4} 2$

$\frac{75\pi}{2} \approx 117.75 \text{ ft}^3$

b)

6, ←20→

$H = 24$

100π

$\frac{2400\pi}{3}$

$800\pi \approx 2512 \text{ ft}^3$

All problems on this side are worth 2 points!

5) Find the surface area:

2"
3"
4"
2"
2"

2×12
2×6
2×8

$52 \ In^2$

6) Find the volume of an irregular tetrahedron (which is a pyramid with a triangular base) that has a height of 2 meters, and a triangular base as shown below.

13 cm
37 cm
40 cm

$s = 45$

$A = \sqrt{45 \cdot 5 \cdot 8 \cdot 32}$
Base

$A = \sqrt{57600}$

$A = 240$
Base
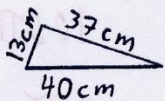
$V = \frac{1}{3}(240) \cdot 200$

$16000 \ cm^3$

or $0.016 m^3$

7) Find the surface area:

6'
5'

$\frac{25\pi}{4}$

$\frac{25\pi}{4}$

30π
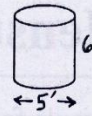
$Sum = \frac{85\pi}{2}$

$\approx 133.5 \ ft^2$

8) Find the volume:

5cm
5cm
8cm
10cm
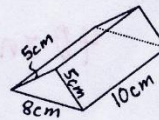
$Area_\Delta = 12$

$V = 12 \times 10 = 120 \ cm^3$

8th Grade

Percents & Growth Test

Instructions:
- No notes or looking at your homework.
- You may use the table on p65.
- Calculators are allowed, but you must write down whatever goes into your calculator.

1) What is 41% of 500?

205

2) What is 60 increased by 25%?

75

3) What is 170% of 300?

510

4) 850 is what percent of 900?

$94\frac{4}{9}\%$

5) 0.7 is what percent of 830?

0.084%

6) What is 485 increased by 4%?

504.4

7) What is 600 decreased by 15%?

510

8) What percent increase is it going from 6500 up to 7200?

10.8%

9) 525 is 28% of what?

1875

10) 837 is 35% more than what?

620

11) What percent decrease is it going from 85 down to 35?

58.8%

(Please turn over →)

12) Rob weighs 160 lb., and Jake weighs 140.

   a) Rob is what percent of Jake's weight?

   114.3 %

   b) Jake is what percent of Rob's weight?

   87.5 %

   c) Rob is what percent heavier than Jake?

   14.3 %

   d) Jake is what percent lighter than Rob?

   12.5 %

13) Pat's house doubled in value over an 8-year period. Give the approximate average annual rate at which the value was increasing during that period?

   9 %

14) A shirt normally listed for $32 is on sale for a 35% discount. What is the new discounted price?

   20.80

15) Jeff paid $57.24 for a book after tax. What was the price of the book before tax? (The tax rate is 8%)

   53

16) Beth put $550 into a savings account at 4.2% interest (compounded annually). What will her balance be after 30years?

   1869.71

Proportions & Dimensional Analysis – Test   Total points = 52

Note:
- You must show what goes into your calculator.
- Each problem is worth 4 points unless otherwise indicated.

1) Jeff biked 32 miles in one hour and 15 minutes. What was his average speed?

$32 \div 1.25$ **25.6 mph**

2) Jill's car has a fuel efficiency of 47mpg on the highway. At that rate, how much gasoline does it take to go 800 miles?

$\dfrac{800}{47}$ **17.0 gall**

3) It takes Mr. Smith 45 minutes to grade 4 tests. How long would it take him to grade 30 tests?

$\dfrac{30}{4} \cdot 45$ 5 hrs 37½ min

337.5 min or **5.625 hrs**

4) What is the weight of 3.8 ft³ of water (in pounds)?

62.43×3.8 **237.234**

5) What is the density (in lbs/ft³) of a rock that weighs 29.3 lbs and has a volume of 210 in³?

$\dfrac{\frac{29.3}{210}}{1728}$ **241 $\frac{lbs}{ft^3}$**

6) What is the volume (in cm³) of an 8-kg block of iron?

$V = \dfrac{W}{D} = \dfrac{8000g}{7.1 \frac{g}{cm^3}}$ **≈1127 cm³**

7) Unit Conversions (2 points each)

a) 24 g ≈ __0.847__ oz

b) 200 mℓ ≈ __6.76__ fl.oz.

c) 3140 km ≈ __1950__ mi

d) 1¾ ft ≈ __53.4__ or 53.3 cm

e) 17.3 ℓ ≈ __36.5__ pt

f) 4,000,000 cm³ ≈ __141__ ft³

8) Use the chain rule (and show your work!) for each problem. You are NOT allowed to use the conversion table for these problems. The only facts you need to know and use are:
- 1000m = 1km
- 3600s = 1h   (s = second; h = hour)
- 12 in = 1 ft
- 10 oz = 1 lb.

(2 points each)

a) $10 \frac{m}{s} =$ __36__ $\frac{km}{h}$

$\dfrac{10\,m}{s} \cdot \dfrac{3600s}{1\,hr} \cdot \dfrac{1\,km}{1000m}$

b) $253 \frac{lb}{ft^3} =$ __2.34__ $\frac{oz}{in^3}$

$\dfrac{253\,lb}{ft^3} \cdot \dfrac{1\,ft^3}{1728\,in^3} \cdot \dfrac{16\,oz}{1\,lb}$

9) The island of Madagascar is shown on the map below. The scale of the map is 1:24,000,000. What is the length of the island?

7.0 cm

1680 km
or
1040 mi

10) The actual distance between Wuhan and Shanghai, in China, is about 1020km. Give both the verbal and the fractional scale of the map shown below.

2.9cm

Fractional
1: 35,200,000

Verbal
1 cm = 352 km
(or 1 km = 556 mi)

11) The exchange rate for the Indian Rupee is 0.0231 $\frac{dollars}{rupee}$. (2 points each)

a) How many rupees is one dollar worth?

43.29 Rupees

b) How many dollars is 3000 rupees worth?

$69.30

12) *Extra Credit* (Do only if you have extra time!)

In Paris, France, Henri owns La Belle Concrete Ltd. He charges 55 euros per cubic meter to do a job. (1 point each)

a) How much would he charge to pour the concrete needed for a parking area measuring 80m by 30m if the concrete is to be 30cm deep?

$V = 720 \, m^3$

$cost = 55 \times 720$

39,600 €

b) Convert his rate (55 $\frac{euro}{m^3}$) to dollars per ft^3. (The exchange rate is 1.2832 $\frac{dollars}{euro}$.)

$$\frac{55 €}{m^3} \cdot \frac{1.2832 \$}{€} \cdot \frac{m^3}{35.31 \, ft^3}$$

$2.00/ft^3

Algebra Test

Simplify. (2 points each)

1) $-7 - 5$ ⟨-12⟩

2) $(-6)(-2)$ ⟨12⟩

3) $12 - 3 \cdot 5$ ⟨-3⟩

4) $-5 + -3 - -2 - +7$

$-5 - 3 + 2 - 7$

⟨-13⟩

5) $5x^4 + 2x^4$ $7x^4$

6) $6x^3 + 3x^4$ $\emptyset$

7) $(y^3)^4$ y^{12}

8) $x^4 \cdot x^2$ x^6

9) $4X + 3 + 5X - 8$

$9X - 5$

Evaluate the expression given
$X = 3; Y = 5; Z = -4$

10) $Y^2 - 3Z + 4X$

$25 + 12 + 12$

⟨49⟩

Solve each equation by getting X alone. *Except for #13, you must show what is done to each side.* (2 points each)

11) $8 + X = 3$

$\,-8\quad -8$

$X = -5$

12) $-5x = 20$

$\div -5 \quad \div -5$

⟨$X = -4$⟩

13) $\frac{3}{7} = \frac{5}{x}$ $x = \dfrac{35}{3} = 11\frac{2}{3}$

14) $\frac{2}{3} X = 8$

$\div \frac{2}{3} \quad \div \frac{2}{3}$

$X = \frac{8}{1} \cdot \frac{3}{2}$

⟨$X = 12$⟩

Solve each equation by getting X alone.
You must show what is done to each side.
(4 points each)

15) $4X - 3 = 7X - 18$

$$-7x + 3 \quad -7x + 3$$

$$-3x = -15$$
$$\div -3 \quad \div -3$$

$$\boxed{x = 5}$$

16) $10 - 2(X - 3) = 6X - 5 - X$

$$10 - 2x + 6 = 6x - 5 - x$$

$$16 - 2x = 5x - 5$$
$$+5 \; +2x \qquad +2x \; +5$$

$$21 = 7x$$
$$\div 7 \quad \div 7$$

$$\boxed{X = 3}$$

17) $2X + 5 = -15$

$$-5 \quad -5$$

$$2x = -20$$
$$\div 2 \quad \div 2$$

$$\boxed{x = -10}$$

18) $4 - 2X + 9X = 27 - 3X - 3$

$$4 + 7x = 24 - 3x$$
$$-4 + 3x \quad -4 + 3x$$

$$10x = 20$$
$$\div 10 \quad \div 10$$

$$\boxed{X = 2}$$