Workshop 20200201 – Information for Ian.

Material covered in my presentation: Please post that students and parents can review (I did not use math symbols in this presentation).

Parts of the whole:

How much time does it take to fill up a pool with 3 taps (A, B, and C) if each takes 4, 5, and 7 hours respectively? Do the same if you have 2 taps (A and B) and one draining pipe in 3 hours. Express the answer as a fraction in lowest terms.

Method

Let X be the number of hours. Then,

$1=X/4+X/5+X/7$

$140=(35+28+20)*X=83X$

$X=140/83$

For the second case: Let X be the number of hours. Then,

$1=X/4+X/5-X/3$

$60=(15+12-20)*X=7X$

$X=60/7$

Mixtures

Bag A has 20 kg of which 45% is sand (by weight) and the rest is pebbles. You combine it with another bag B and that also has mixture of sand and pebbles. The weight of the combined mixture is 50 kg with 50% sand (by weight). What percentage of pebbles were in bag B? Round the answer to the nearest whole number.

Method

Total weight of sand in bag A: 9 kg.

Total weight of sand in combined mixture: 25 kg.

Weight of Bag B: 50-20=30 kg.

Weight of sand in bag B: 25-9=16 kg.

Weight of pebbles in bag B: 30-16=14 kg.

Percentage of pebbles in bag B: (14/30)*100=140/3, or 46.666…
Round to whole number: 47

Polygons, angles and their sum.
Acute angle: less than 90 deg
Right angle: 90 deg
Obtuse angle: more than 90 deg and less than 180 deg
Convex polygon: all angles are less than 180 deg

Sums of all angles of a polygon with N sides.
Polygon with N sides can be divided into N-2 triangles.
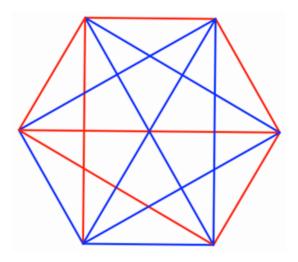**So total sum of angles is (N-2)*180**

Regular polygon: all angles and all sides are the same.
Examples are equilateral triangle and square.

What is the value of each angle for a regular polygon?
So, value of each angle is ((N-2)*180)/N

Congruent triangles: two triangles are congruent if all their sides have the same values.

Similar triangles: two triangles are similar if all their angles have the same values.

How many non congruent triangles can be formed using entire sides and/or entire lengths of diagonals of a regular hexagon?
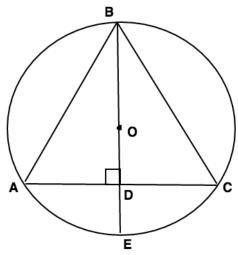
3 Options:
a) Two sides and 1 diagonal: 1
b) One side and 2 diagonals: 1
c) Three diagonals: 1

What is the area of equilateral triangle inscribed in a circle with area PI?
Area of circle is PI=PI*r*r. So, r=1
OA=r=1, OD=1/2, h=1/2+1=3/2, AD=sqrt(1-1/4)=sqrt(3)/2, AC is side b of the triangle. b=AC=2*AD=sqrt(3),
Area of triangle=(b*h)/2=(sqrt(3)*(3/2))/2=3sqrt(3)/4

My notes to the answers to 2020 Page 1 and Page 2 handouts:
Page 1:
#16.
(X+15)/(X+25)=14/19
19*(X+15)=14*(X+25)
5X+5*15=14*10=140
5X=65
X/(X+10)=13/23

#17.
X/6+(7-X)/10=1
5X+21-3X=30
2X=9
X=9/2

#18.
(2^2-PI2^2/4)*4=(4-PI)4
0.86*4 rounded to 3.

#19.
0.95X-Y=5250, Y-0.75X=1750, 0.2X=7000, X=35000
0.75X+1750=26250+1750=28000

#20.
54.5+549.5=604

Page 2:
#21.
Total is 16.
For 1-2 and 2-3 => 3-4, and 4-1. So 3 possibilities only for 1-2
Same for 1-3 and 1-4 so total is 3*3=9

#22.
Full pool has (2250*100)/75=3000. 80% pool has 2400.
Number of hours is 2400/120=20

#25.
N=7*k^3, 2016=7*3^2*2^5, so 7^2*k^3*3^2*2^5 is a square,
so k^3 is square, so k=2, so N=7*8=56

#26.
Sum of angles 180*(5-2)=540. 4N<180, M=N*K/2<180
N*(1+2+3+4+K/2)=540=10N+NK/2=540
If N=44=>NK/2=100 K/2=100/44 NG (No Good).
If N=43=>NK/2=110 K/2=110/43 NG.
If N=42=>NK/2=120 K/2=120/42 NG.
If N=41=>NK/2=130 K/2=130/41 NG.
If N=40=>NK/2=140, K/2=3.5, K=7.
If N=39=>NK/2=150 K/2=150/39 NG.
If N=38=>NK/2=160 K/2=160/38 NG.
If N=37=>NK/2=170 K/2=170/37 NG.
N=36 is too small as 10N=360.
So, M=40*7/2=140

#4.
List of all subjects: 1,2,3,…,13.
1 and all primes are ok.
8,10,12 NG.
So, remaining are 4 (sum is 1+2+4=7), 6 (sum is 1+2+3+6=12),
9 (sum is 1+3+9=13).
So, from the number 1 and all primes we get
1+3+4+6+8+12+14=48
From the other three number we get 7+12+13=32
Total is 48+32=80