

2017 Workshop problems Handouts (4 pages):

From 2013-2014

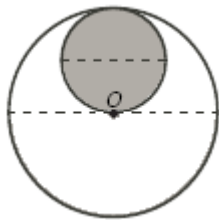
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1. Every student in a class of 20 sent an e-mail to each of the other students of the class. How many e-mails were sent in total?

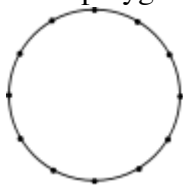
2. What is the value of 1002×998 ?

3. $3^{11} \times 3^{2014} = 3^{N \times 27}$. What is the value of N ?

4. The two circles below are tangent. The point O is the centre of the big circle and is also on the circumference of the small circle. The measure of the circumference of the big circle is $32\sqrt{\pi}$. What is the area of the shaded region?



5. 12 points are equally spaced on a circle. How many non-congruent decagons (ten sided polygons) can be formed using any 10 of these 12 points as vertices?

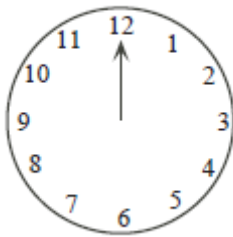


From 2014

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6. Round 0.2014×100 to the nearest whole number.

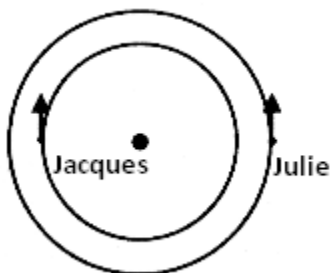
7. What is the acute angle (in degrees) between the hour hand and the minute hand at 3:30?



8. You traveled 4.725 km at a speed of 13.5 km/h. How many hours did you travel? Express your answer as a fraction.

9. The points $(0,0)$, $(2,7)$, and $(k,20)$ lie on a line. What is the value of k ? Express your answer as a common fraction.

10. Jacques runs on the inner track. Julie runs on the outer track. The radius of the outer track is R . The radius of the inner track is r . For every 17 full circles that Julie completes, Jacques completes 19 full circles. Jacques' speed is $\frac{29}{31}$ of Julie's speed. What is the value of $\frac{R}{r}$? Express your answer as a common fraction.



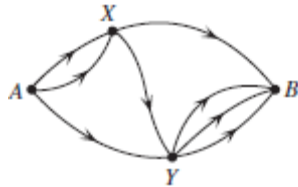
From 2014

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11. In the summation below $D=B+C$. What is the value of $A+B+C+D$?

$$\begin{array}{r} 2BA \\ + C6D \\ \hline 8AD \end{array}$$

12. What is the smallest whole number N such that $5^N > 4000000$?
13. In how many ways can you walk from Point A to point B if you must walk along the directions marked by arrows?

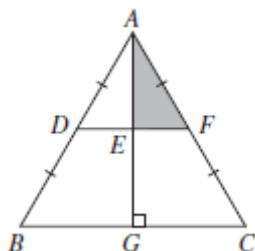


14. Suppose that when a man is at point A (see the figure for Question 13), the probability that he walks along any of the three paths is $\frac{1}{3}$. If he is at point X the probability that he walks along any of the 2 paths is $\frac{1}{2}$. If he is at point Y, the probability that he walks along any of the three paths is $\frac{1}{3}$. Two men walk independently from point A to point B. What is the probability that both choose the same path?

15. $\triangle ABC$ is equilateral with side 4. $AD = DB$, and $\triangle ADF$ is equilateral.

What is the difference between the area of $EFCG$ and $\triangle AEF$?

Express your answer as \sqrt{N} where N is a positive whole numbers.



From 2015

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16. N , $N + K$, and $N + 2K$ are all integers and $K > 0$.
 $N(N + K)(N + 2K) = P$ where P is prime.
What is the value of N ?
17. Zake tossed a coin 5 times and got at least one head.
What is the probability that he got exactly 4 heads?
Express your answer as a common fraction in lowest terms.
18. You can use the digits 2, 0, 1, and 5 to form three digit numbers (but only the digit 1 is allowed to be used more than once). How many numbers can be formed? Examples for valid numbers: 111, 101, 251, 502.
19. A regular polygon has 120 sides. How many non congruent regular polygons can be drawn using corners of this polygon as their corners?
20. Yoko is more than 8 years old and is younger than 50.
The sum of all factors of her age is twice her age.
What is her age (in years)? Note that 1 and N are factors of N .

Answers:

Page 1

1. 380
2. 999996
3. 75
4. 64
5. 6

Page 2

6. 20
7. 75
8. $\frac{7}{20}$
9. $\frac{40}{7}$
10. $\frac{589}{493}$