Magic Math Contest

PLEASE DO NOT PUT UNITS IN ANSWER

1. _____400_____ Evaluate $20 \cdot 9 + 20 \cdot 11$.

2. _____21_____ How many sides does a square, hexagon, triangle, and octagon have combined?

3. _____40_____ What is the sum of all odd numbers between 6 and 14?

4. _____24_____ A right triangle has a leg of length 7 and hypotenuse of 25. What is the length of the third side?

5. _____3_____ Bob walked at a rate of 4 mph for 30 minutes and then 3 mph for 20 minutes. How many miles did he walk in total?

6. _____12_____ How many positive integers divide 72?

7. _____8_____ What is the remainder when $12 \cdot 11 \cdot 9$ is divided by 10?

8. _____211_____ What is the smallest prime number greater than 200?

9. _____14_____ how many diagonals does a heptagon have?

10. _____66_____ What is $66\frac{2}{3}\%$ of 99?

11. _____16_____ What is the sum of the digits of 1111^2

12. _____31_____ How many proper subsets (non-empty subsets) are there of the set $[1, 2, 3, 4, 5]$. A subset of a set is any combination of the numbers. Examples would be $[1, 3, 5]$ or $[1, 2, 3, 4]$. Remember the order of the numbers does not matter.

13. _____1000_____ Evaluate $a^3 + 3a^2b + 3ab^2 + b^3$ if a is 7 and b is 3.

14. _____1/6_____ 2 dice are rolled. What is the probability that the sum of the dice is 7? Answer as a common fraction in simplest form.

15. _____20_____ Bob and John are working on mowing a lawn. Bob can mow the lawn alone in 60 minutes. John can mow it in 30 minutes. How long will it take them to mow the lawn if they work together?
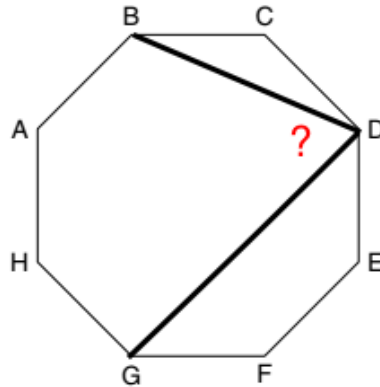
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16. _____11_____ The side lengths of a square are increased by 2. If the area increases by 40, what is the new side length of the square?

17. _____6_____ The triangle $\triangle ABC$ has angle bisector $\overline{AD}$. $\overline{BD}$ is 10 and $\overline{CD}$ is 8. If the perimeter of the triangle is 72, What is $\overline{AB}$ - $\overline{AC}$?

18. _____540_____ Simplify $\frac{9^3 4^5 5}{3^3 2^8}$

19. _____67.5_____ The image below shows a regular octagon ABCDEFGH. What is the measure of angle $\angle$BDG? Express your answer as a decimal to the nearest tenth.

20. _____1/25_____ From a deck of 52 cards (standard 4 suits with 13 unique cards each) 2 cards are dealt. What is the probability the second card has the same number as the first card if they both are the same color (red or black)?

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Bonus Problems

21. _____12_____   A equilateral triangle with side length 6 is inscribed in a circle. What is the area of the circle. Don't write π in your answer. So if the answer was 17π, just answer 17.

22. _____204_____   What is the area of a triangle with side lengths of 17, 25, and 26?