

1. What is the value of  $2^{13}$  ?

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2. The perimeter of a rectangle is 18 cm.  
The length of the rectangle is twice the width.  
What is the number of  $\text{cm}^2$  in the area of the  
rectangle?



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3. Twenty percent of 20% of a certain  
number is 20. What is the number?

4. The measures of the angles of a triangle are in the ratio  $2:3:4$ . What is the degree measure of the largest angle?

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5. What is the (positive) value of  $\sqrt{x^3 + y^3}$  when  $x = 8$  and  $y = 4$ ?

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6. Simplify:  $\frac{35}{0.014}$

**7.** Beti has  $25\%$  more loonies than Alfie. Between them they have 99 loonies. How many loonies does Alfie have?

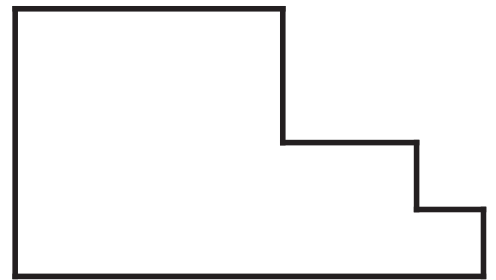
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**8.** The area of a circle is less than  $300\pi$   $\text{cm}^2$ . If the radius of the circle is an integer number of cm, what is the largest possible number of cm in the radius of the circle ?

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**9.** At Mall-Wart<sup>TM</sup>, 4 pants and 6 shirts cost \$288. How much do 10 pants and 15 shirts cost?

**10.** The figure below is made by sliding together a  $4 \times 4$  square, a  $2 \times 2$  square, and a  $1 \times 1$  square. What is the perimeter of the figure?



**11.** What is the value of  $4^3 + 5^3 + 6^3$  ?

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**12.** What is the 40-th number in the sequence 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 6, ... ?

**13.** A triangle with sides 6, 8, and 10 is inscribed in a circle. What is the area of the circle? Express your answer in terms of  $\pi$ .

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**14.** A drawer contains 4 white socks and 4 black socks. Alicia removes 2 socks from the drawer, chosen at random. What is the probability that the socks are of the same colour? Express your answer as a common fraction.

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**15.** A prime number  $p$  is called a *Sophie Germain* prime if  $2p + 1$  is also prime. What is the smallest Sophie Germain prime that is bigger than 30?

**16.** At 3:00 o'clock the angle between the hour hand and the minute hand of a clock is  $90^\circ$ . What is the angle between the two hands at 3:10?

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**17.** Peter can pick 3 pecks of peppers in 4 hours. Petra can pick 4 pecks of peppers in 3 hours. Working together, how many pecks of peppers can Peter and Petra pick in 12 hours?

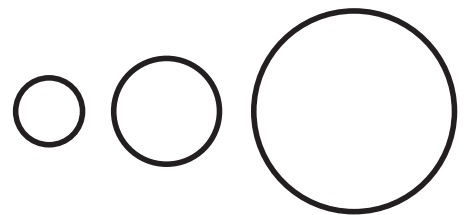
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**18.** What is the sum of the two positive integers  $x$  such that  $x^2 + 40$  is a perfect square?

**19.** A mother who is 180 cm tall is standing in the sunshine beside her 120 cm tall child. If the child casts a 70 cm shadow, what is the number of cm in the shadow cast by the mother?

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**20.** Three circles have, respectively, radius 4, 6, and 12 units. What is the radius of the circle whose area is the sum of the areas of the three circles?



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**21.** Two fair dice are tossed. What is the probability that the positive difference between the numbers obtained is 1? Express your answer as a common fraction.

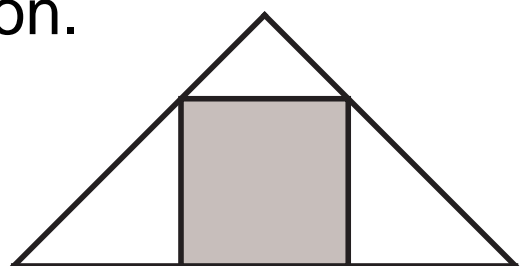
**22.** Four numbers form an arithmetic sequence. The smallest of the four numbers is 5 and the largest is 15. What is the sum of the four numbers?

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**23.** Let  $D(x, y) = x^2 - y^2$ . What is the value of  $D(125, 25)$ ?

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**24.** A square is inscribed in an isosceles right-angled triangle. Two vertices of the square are on the hypotenuse of the triangle. What is the ratio of the area of the square to the area of the triangle? Express your answer as a common fraction.



**25.** The length of rectangle  $\mathcal{R}$  is 30% more than the side of square  $\mathcal{S}$ , and the width of  $\mathcal{R}$  is 30% less than the side of  $\mathcal{S}$ . The area of  $\mathcal{R}$  is how many percent less than the area of  $\mathcal{S}$ ?



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**26.** What is the sum of the positive integers that divide 81?

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**27.** What is the smallest positive integer  $n$  such that  $n - 4$ ,  $n - 2$ ,  $n + 2$ , and  $n + 4$  are all prime?

**28.** How many integers  $k \geq 8$  are there such that there is a triangle with sides 8, 8, and  $k$ ?

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**29.** There are two different pairs  $(a, b)$  and  $(c, d)$  such that

$$\frac{a!}{b!} = \frac{c!}{d!} = 30.$$

What is the value of  $a + c$ ?

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**30.** How many millilitres of milk must you mix with 180 ml of black coffee so that the mixture is 20% milk?

**31.** What is the least common multiple of the first five positive odd integers?

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**32.** What is the smallest integer which is greater than 2008 and is divisible by both 5 and 9?

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**33.** Alfie and Beth each pick a number from 1 to 10 (inclusive), independently and at random (they could pick the same number). What is the probability that the sum of their two numbers is equal to 16? Express your answer as a common fraction.

**34.** What is the largest number  $n$  less than 100 such that  $n - 1$  and  $n + 1$  are both prime ?

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**35.** One can of paint is required to paint all the faces of a big cube. The big cube is cut up into 64 equal little cubes. How many cans of paint are required to paint all the faces of the 64 little cubes?

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**36.** Suppose that  $4^{x+3} = 8^{x-3}$ . What is the value of  $x$  ?