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2013 Q9

9. The Incredible Hulk can double the distance he jumps with each succeeding jump. If his first jump is 1 meter, the second jump is 2 meters, the third jump is 4 meters, and so on, then on which jump will he first be able to jump more than 1 kilometer?

- (A) 9th (B) 10th (C) 11th (D) 12th (E) 13th

9. Answer (C):

Jump	Distance (meters)
1	$1 = 2^0$
2	$2 = 2^1$
3	$4 = 2^2$
\vdots	\vdots
10	$512 = 2^9$
11	$1024 = 2^{10}$

Because 1024 meters is greater than 1 kilometer, he first exceeds 1 kilometer on the 11th jump.

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2015 Q9

9. On her first day of work, Janabel sold one widget. On day two, she sold three widgets. On day three, she sold five widgets, and on each succeeding day, she sold two more widgets than she had sold on the previous day. How many widgets in total had Janabel sold after working 20 days?

- (A) 39 (B) 40 (C) 210 (D) 400 (E) 401

9. **Answer (D):** Note that Janabel has sold a total of 1 widget after 1 day, $1 + 3 = 4 = 2^2$ after 2 days and $1 + 3 + 5 = 9 = 3^2$ widgets after 3 days. It can be shown that this pattern continues so that after 20 days, Janabel has sold a total of $20^2 = 400$.

OR

The sum of the first 20 odd numbers $1, 3, 5, \dots, 39$ is needed. The sum of the first and last is 40, the sum of the second and 19th is also 40, and in fact, there are 10 pairs of numbers that each add up to 40. Thus the required sum is 400.