11. If A*B means $\frac{A+B}{2}$, then (3*5)*8 is

A) 6 B) 8 C) 12 D) 16 E) 30

1986 Q11

11. (A) $(3*5)*8 = \left(\frac{3+5}{2}\right)*8 = 4*8 = \frac{4+8}{2} = 6.$

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1998 Q11

11. Harry has 3 sisters and 5 brothers. His sister Harriet has S sisters and B brothers. What is the product of S and B?

(A) 8 **(B)** 10 **(C)** 12 **(D)** 15 **(E)** 18

11. **Answer (C):** Since Harry has 3 sisters and 5 brothers, there are 3 girls and 6 boys in the family. So Harriet has 2 sisters and 6 brothers. The product of 2 and 6 is 12.

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2001 Q12

12. If $a \otimes b = \frac{a+b}{a-b}$, then $(6 \otimes 4) \otimes 3 =$

(A) 4 (B) 13 (C) 15 (D) 30 (E) 72

12. (A) $6 \otimes 4 = \frac{6+4}{6-4} = \frac{10}{2} = 5$, and $5 \otimes 3 = \frac{5+3}{5-3} = \frac{8}{2} = 4$.

Note: $(6 \otimes 4) \otimes 3 \neq 6 \otimes (4 \otimes 3)$. Does $(6 \otimes 4) \otimes 3 = 3 \otimes (6 \otimes 4)$?

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2010 Q13

13. The lengths of the sides of a triangle measured in inches are three consecutive integers. The length of the shortest side is 30% of the perimeter. What is the length of the longest side?

(A) 7 **(B)** 8 **(C)** 9 **(D)** 10 **(E)** 11

13. **Answer (E):** One strategy is to try the choices:

$$\begin{array}{ll} 5+6+7=18; & 5 \neq 30\% \text{ of } 18 \\ 6+7+8=21; & 6 \neq 30\% \text{ of } 21 \\ 7+8+9=24; & 7 \neq 30\% \text{ of } 24 \\ 8+9+10=27; & 8 \neq 30\% \text{ of } 27 \\ 9+10+11=30; & 9 = 30\% \text{ of } 30 \end{array}$$

If the shortest side is 9, then the longest side is 11.

OR

Let the three consecutive integers be side lengths $x, x-1$, and $x-2$.

$$\begin{aligned} x-2 &= 0.3(x+x-1+x-2) \\ x-2 &= 0.3(3x-3) \\ x-2 &= 0.9x-0.9 \\ 0.1x &= 1.1 \end{aligned}$$

$$x = 11$$

The longest side is 11.

2014 Q13

13. If n and m are integers and n^2+m^2 is even, which of the following is impossible?

(A) n and m are even **(B)** n and m are odd **(C)** $n+m$ is even

(D) $n+m$ is odd **(E)** none of these is impossible

13. **Answer (D):** If $n^2 + m^2$ is even, then n^2 and m^2 are either both even or both odd, which means n and m are either both even or both odd. If n and m are both even, their sum is even. If n and m are both odd, their sum is even. Because $n + m$ is never odd, (D) is the impossible choice.

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1988 Q14

14. ◊ and Δ are whole numbers and ◊ x Δ = 36. The largest possible value of ◊ + Δ is

A) 12 B) 13 C) 15 D) 20 E) 37

14. E The factor pairs for 36 are 1x36, 2x18, 3x12, 4x9, and 6x6. The largest sum of such a pair is 37.