

"out of n pick r"

7. ${}_{10}P_2$

$$= \frac{n!}{(n-r)!}$$
$$= \frac{10!}{(10-2)!}$$
$$= \frac{10!}{8!}$$
$$= \frac{\cancel{1} \cdot \cancel{2} \cdot \cancel{3} \cdot \cancel{4} \cdot \cancel{5} \cdot \cancel{6} \cdot \cancel{7} \cdot 8 \cdot 9 \cdot 10}{\cancel{1} \cdot \cancel{2} \cdot \cancel{3} \cdot \cancel{4} \cdot \cancel{5} \cdot \cancel{6} \cdot \cancel{7} \cdot \cancel{8}}$$
$$= 9 \cdot 10$$
$$= \boxed{90}$$

8. out of 15 pick 3

$${}_{15}P_3 = \boxed{2730}$$

9. out of 30 pick 4

$${}_{30}P_4 = \boxed{657,720}$$

10. out of 12 pick 2

$${}_{12}P_2 = \boxed{132}$$

11. 8C_3

$$= \frac{n!}{(n-r)! \cdot r!}$$
$$= \frac{8!}{(8-3)! \cdot 3!}$$
$$= \frac{\cancel{1} \cdot \cancel{2} \cdot \cancel{3} \cdot \cancel{4} \cdot \cancel{5} \cdot \cancel{6} \cdot \cancel{7} \cdot \cancel{8}}{\cancel{1} \cdot \cancel{2} \cdot \cancel{3} \cdot \cancel{4} \cdot \cancel{5} \cdot 1 \cdot 2 \cdot 3}$$
$$= \frac{6 \cdot 7 \cdot 8}{1 \cdot 2 \cdot 3}$$
$$= \frac{\cancel{2} \cdot 7 \cdot 8}{1 \cdot \cancel{2}}$$
$$= \boxed{56}$$