

permutation
combination

order matters
order does not matter

password
ice cream bowl

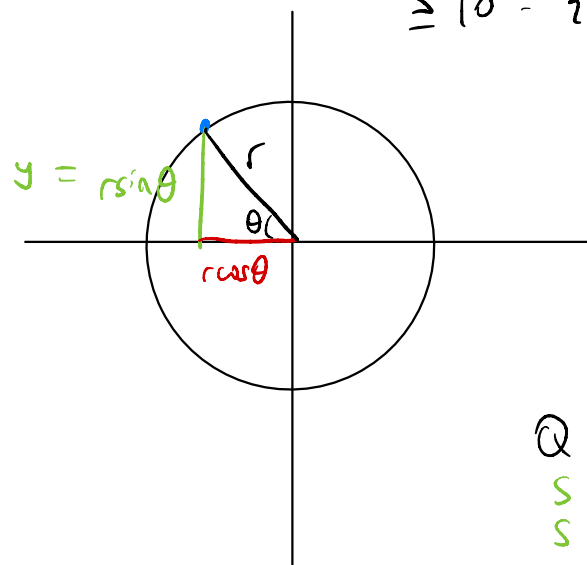
5-22-22 English 67F



rip wallet Today at 10:28 AM

Carlos has to get a good score on a test when guessing. If there are 20 questions with 6 multiple choice answers each question and it takes 10 right questions to pass, can he pass?

$\geq 10 = \{10, 11, 12, 13, \dots, 20\}$
questions correct



$$\sin \theta = \frac{y}{r}$$

$$y = r \sin \theta$$

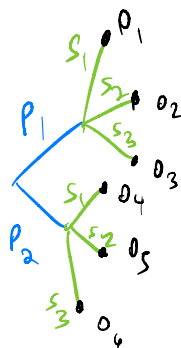
Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
S	S	S	S	S	F	F	F	F	F
S	S	S	S	F	S	F	F	F	F
1	2	3	4	5	6	7	8	9	10

Success
Fail

$$p = \frac{1}{6}$$

$$1-p = \frac{5}{6}$$

Outfit 2 pants 3 shirts



2 x 3

exactly
10 questions
right

$$\underbrace{\binom{20}{10}}_{\text{orderings}} \left(\frac{1}{6}\right)^{10} \left(\frac{5}{6}\right)^{10}$$

correct incorrect

combination

$\binom{10}{5}$ from 10 objects grab 5
(order unimportant)

$$\geq 10 = \{10, 11, 12, 13, \dots, 20\}$$

questions correct

$$\underbrace{\binom{20}{10} \left(\frac{1}{6}\right)^{10} \left(\frac{5}{6}\right)^{10}}_{10 \text{ correct}} + \underbrace{\binom{20}{11} \left(\frac{1}{6}\right)^{11} \left(\frac{5}{6}\right)^9}_{11 \text{ correct}}$$

$$\dots, \underbrace{\cancel{\binom{20}{20}} \left(\frac{1}{6}\right)^{20} \cancel{\left(\frac{5}{6}\right)^0}}_{20 \text{ correct}}$$

$$e^{ix} = \cos(x) + i \sin(x)$$

$$e^{i\pi} = \cos(\pi) + i \sin(\pi)$$

$$= -1 + i(0)$$

$$= -1$$