Team Round

1. Peter Pan is x amount of years old, and is ⅙ Captain Hook's age. In three years, he will be 2/11 Captain Hook's age. Remember, Peter Pan never ages! How old is Peter Pan?

Answer: x = 6

2. Bo Peep has a bag of buttons. Her bag contains 17 white buttons, 12 periwinkle buttons, 3 pink buttons, and 8 yellow buttons. She takes out 25 buttons from the bag to sew onto her new dress. How many of the removed buttons are yellow if the probability of picking a yellow button from the bag now is ⅓?

Ans: 5
(40-25 = 15, 15/3 = 5)

3. The White Rabbit is perpetually tardy and therefore carries a pocket watch. Watches (and clocks in general) count time in base 6. What is 413 (in base 6) converted to base 10?

Ans:

153

4. Woody and Buzz Lightyear have 2 bags of marbles. Bag A has 5 red and 2 yellow marbles. Bag B has 3 red and 5 yellow marbles. A bag and marble are chosen at random. If the chosen marble is red, what is the probability that the chosen bag was Bag A?

Ans: 40/61
Conditional probability

Probability of choosing red from bag A = ½(5/7) = 5/14
Probability of choosing red from bag B = ½(⅜) = 3/16
Probability of choosing red = 5/14+3/16 = 61/112
Probability of bag a, given red = 5/14/(61/112) = 40/61

5. The great mouse detective has a dilemma. In one out of every 5 cases, the butler is the murderer. In one out of every 10 cases, the landlord is the murderer. If the detective has 20 cases to solve, in how many cases can he predict that the butler will be the murderer (according to past data)?

Ans: 4

6. A gold coin has two sides: the crown side and the plain side. There is an equal probability of landing on the crown and the plain side. Vanellope flips a gold coin 3 times. Ralph flips a gold coin 2 times. What is the probability that Vanellope flips the crown side more times than Ralph?

Ans: ½
V = num crowns for vanellope
R = num crowns for ralph
Possible ways that v > r:
Case 1: 3V and any amount of R = (½)^3 = 1/8
Case 2: 2V and 1 R = (½)^3(3) x ½ = 3/16
Case 3: 2V and 0R = ⅜ x ¼ = 3/32
Case 4: 1V and 0R = ⅜ x ¼ = 3/32
Add them … ⅛ + 3/16 + 3/32 + 3/32 = ½

7. Russell carries a backpack that contains five pieces of paper, each labeled with one of the digits "1, 2, 3", '"4" or "5", with no repeats. He randomly draws 3 numbers out of his backpack, without replacement, to construct a three-digit number. What is the probability that the three-digit number is a multiple of 3? (answer as a fraction)

Ans: 2/5

The only thing that matters is sum... order doesn't matter ↠ picking 3 numbers out of 5 = 10 possibilities

123 = yes

124 = no

125 = no

**134 = no**

135 = yes

145 = no

234 = yes

235 = no

245 = no

345 = yes

8. Remy, the rat, has a rectangular area of cookie dough with sides 8 and 2sqrt(2). He then takes a circular cookie cutter with radius 2 and overlaps the center of the cutter with the center of the rectangle such that the both cords are formed by a 90 degree angle from the center. After he finishes cutting, what is the area of the cookie Remy has cut?
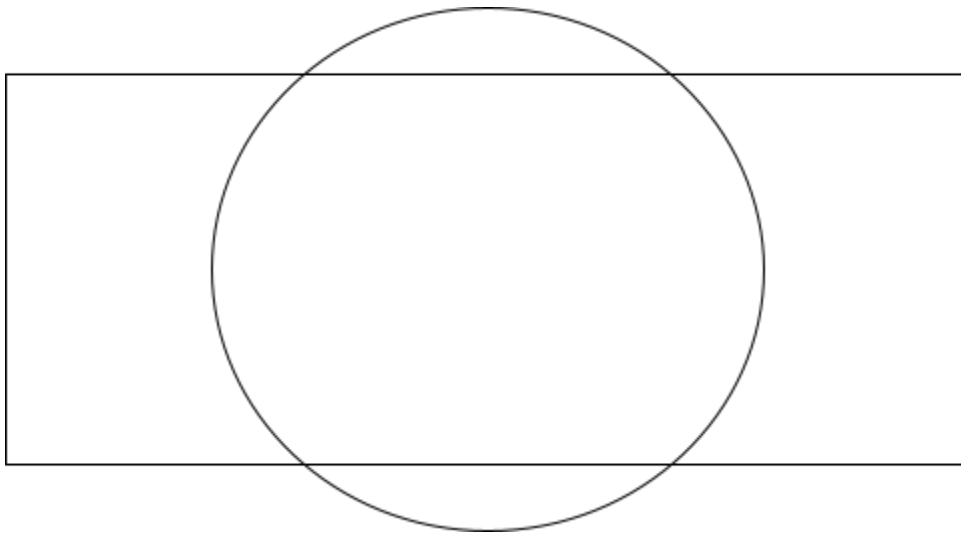
Answer: 2pi + 4

9. Cinderella is at a ball. During the ball, three spotlights project circles with radii of 6 overlapping over her. The spotlights overlap in such a way that each circle crosses the center of the other 2 circles. What is the area of the section that all three circles share?

Answer: $18\pi - 18\sqrt{3}$

10. The heart of Te Fiti displayed a random number between 1-10. A fair dice with numbers 1-6 is rolled. What is the probability that the product of the number on the heart of Te Fiti and the die will be a perfect square?

Answer: 11/60