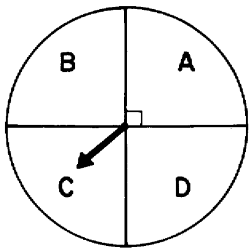
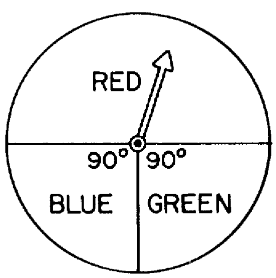
A2.S.15: Binomial Probability 10: Know and apply the binomial probability formula to events involving the terms exactly, at least, and at most

1 The fair spinner shown in the diagram below is spun three times. What is the probability of getting a *C* exactly twice?



1) $\frac{1}{4}$
2) $\frac{1}{2}$
3) $\frac{27}{64}$
4) $\frac{9}{64}$

2 If the spinner below is spun five times, what is the probability that it will land in the green area exactly three times?

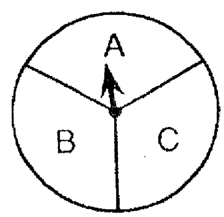


1) $\frac{3}{4}$
2) $\frac{1}{64}$
3) $\frac{45}{512}$
4) $\frac{135}{512}$

3 A spinner is divided into eight equal sections. Five sections are red and three are green. If the spinner is spun three times, what is the probability that it lands on red *exactly* twice?

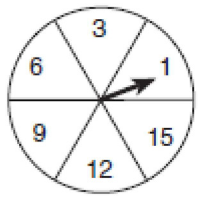
1) $\frac{25}{64}$
2) $\frac{45}{512}$
3) $\frac{75}{512}$
4) $\frac{225}{512}$

4 In the accompanying diagram, a circle with a spinner is divided into three regions such that $P(A) = P(B) = P(C) = \frac{1}{3}$.



If the spinner is spun five times, what is the probability that it will land in region *A at most* two times?

5 The circle in the accompanying diagram is divided into six regions of equal area and has a spinner. The regions are labeled 1, 3, 6, 9, 12, and 15. If the spinner is spun five times, what is the probability that it will land in an even-numbered region *at most* two times?

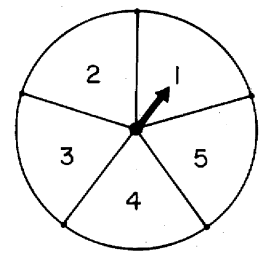


6 A board game has a spinner on a circle that has five equal sectors, numbered 1, 2, 3, 4, and 5, respectively. If a player has four spins, find the probability that the player spins an even number *no more than* two times on those four spins.

7 A circle that is partitioned into five equal sectors has a spinner. The colors of the sectors are red, orange, yellow, blue, and green. If four spins are made, find the probability that the spinner will land in the green sector
(1) on *exactly* two spins
(2) on *at least* three spins

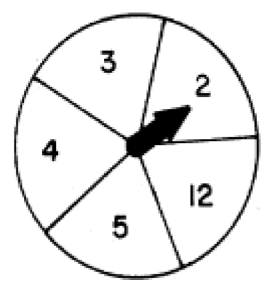
8 A spinner is divided into two regions, green and red. The probability of the pointer landing on the green region is $\frac{2}{3}$. The pointer is spun 5 times. What is the probability of the pointer landing on the green region *exactly* 2 times? What is the probability of the pointer landing on the red region *at least* 4 times?

9 The circle shown in the accompanying diagram is divided into five regions of equal area labeled as shown. On any spin of the spinner, the probability of stopping on any of the regions is the same.



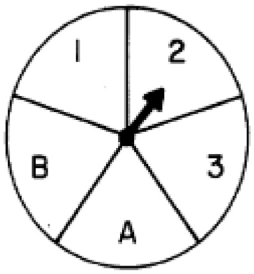
a Find: *P*(3); *P*(even); *P*(odd)
b Find the probability of:
(1) spinning *exactly* 3 *odd* numbers on 4 random spins
(2) spinning *at least* 3 *even* numbers on 4 random spins

10 The diagram below shows a disc with an arrow that can be spun so that it has an equal chance of landing on one of the 5 regions of the disc.



What is the probability that it will land on a prime number? If the spinner is spun 3 times, determine the probability that the spinner will land on a prime number.
(1) *exactly* twice
(2) *at least* twice
(3) *no more than* twice

11 In the accompanying diagram, the circle is divided into five equal sections. Assume an unbiased experiment when a spinner is spun.

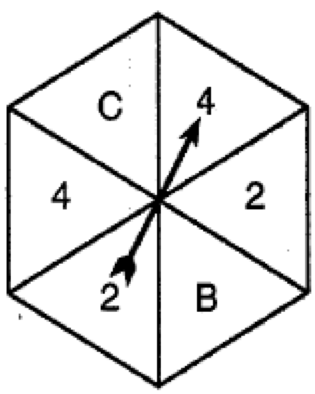


a If the spinner is spun once, find: $P(B)$; $P(\text{number})$

b If the spinner is spun three times, determine the probability it will land on

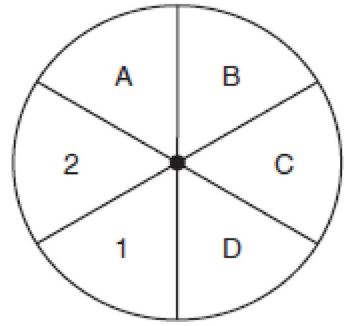
(1) no *B's*
(2) *at least* two numbers
(3) *no more than* one number

12 In the accompanying diagram, a regular hexagon with a spinner is divided into six equal areas labeled with a letter or number.



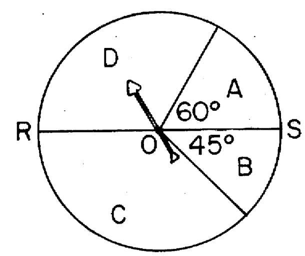
If the spinner is spun four times, find the probability that it will land in a
(1) numbered area *at most* one time
(2) lettered area *at least* three times

13 A spinner is divided into six equal sections and labeled as shown in the accompanying diagram.



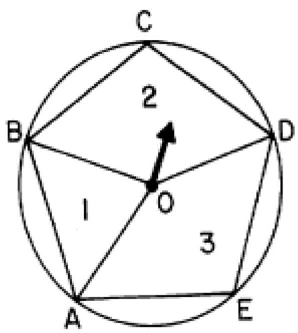
Determine the probability of getting a letter in one spin. Determine the probability of getting *no* letters in three spins. Determine the probability of getting *at least* two letters in three spins.

14 Circle O is partitioned into four regions as shown, with $\overline{ROS}$ a diameter. Assume an unbiased experiment when a spinner is spun.



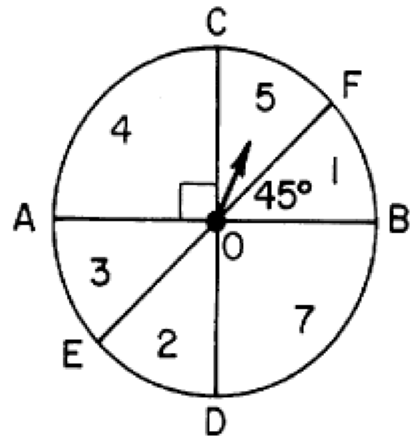
If the spinner is spun once, determine the probability that the spinner will stop in
(1) region A
(2) region C
(3) region D
If the spinner is spun three times, what is the probability that
(1) the spinner will stop in region A *exactly* twice
(2) the spinner will stop in region D *at least* twice

15 In the diagram below, regular pentagon *ABCDE* is inscribed in circle *O*. Radii $\overline{OA}$, $\overline{OB}$, and $\overline{OD}$ divide the pentagon into regions 1, 2, 3. Assume an unbiased experiment when the spinner is spun.



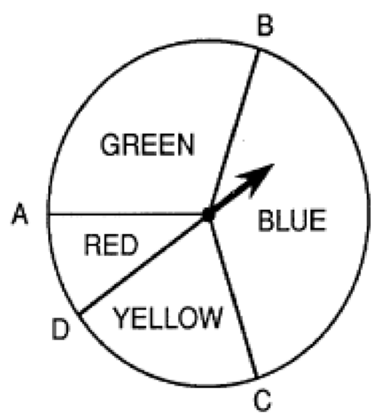
If the spinner is spun once, determine the probability that it will stop
(1) in region 1
(2) in region 2
If the spinner is spun three times, determine the probability that it will stop
(1) in region 1 *no more than* once
(2) in region 2 *at least* twice
(3) in region 2 *exactly* once

16 In the accompanying diagram, circle *O* is partitioned into six regions by diameters $\overline{AOB}$, $\overline{COD}$, $\overline{EOF}$, $\overline{CD} \perp \overline{AB}$, and $m\angle FOB = 45$.



a If the spinner is spun once, determine: $P(3)$; $P(\text{EVEN})$; $P(7)$
b Determine the probability of obtaining:
(1) *exactly two* EVEN's on three spins
(2) *no more than one* three 3 on three spins
(3) *exactly one* 7 on four spins

17 In the accompanying diagram, the circle is divided into four sections as shown, and $m\overset{\frown}{AB}:m\overset{\frown}{BC}:m\overset{\frown}{CD}:m\overset{\frown}{DA} = 3:4:2:1$



a If the spinner is spun once, find: $P(\text{RED})$; $P(\text{GREEN})$
b Determine the probability of obtaining:
(1) *exactly* two GREEN's in three spins
(2) *at least* three RED's in four spins
(3) *at most* two YELLOW's in three spins

A2.S.15: Binomial Probability 10: Know and apply the binomial probability formula to events involving the terms exactly, at least, and at most
Answer Section

1 ANS: 4 REF: 069029siii
2 ANS: 3 REF: 088635siii
3 ANS: 4

$${}_3C_2\left(\frac{5}{8}\right)^2\left(\frac{3}{8}\right)^1 = \frac{225}{512}$$

REF: 011221a2
4 ANS:

$\frac{192}{243}$

REF: 019437siii
5 ANS:

$\frac{192}{243}$

REF: 060142siii
6 ANS:

0.821

REF: 010428b
7 ANS:

$\frac{96}{625}, \frac{17}{625}$

REF: 069739siii
8 ANS:

$\frac{40}{243}, \frac{11}{243}$

REF: 088942siii
9 ANS:

$\frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{216}{625}, \frac{112}{625}$

REF: 018538siii
10 ANS:

$\frac{3}{5}, \frac{54}{125}, \frac{81}{125}, \frac{98}{125}$

REF: 018741siii

11 ANS:
$\frac{1}{5}, \frac{3}{5}, \frac{64}{125}, \frac{81}{125}, \frac{44}{125}$

REF: 088942siii

12 ANS:
$\frac{9}{81}, \frac{9}{81}$

REF: 019739siii

13 ANS:
$\frac{4}{6}, \frac{8}{216}, \frac{160}{216}$

REF: 080342siii

14 ANS:
$\frac{1}{6}, \frac{3}{8}, \frac{1}{3}, \frac{5}{72}, \frac{7}{27}$

REF: 068540siii

15 ANS:
$\frac{1}{5}, \frac{2}{5}, \frac{112}{125}, \frac{44}{125}, \frac{54}{125}$

REF: 068742siii

16 ANS:
$\frac{1}{8}, \frac{3}{8}, \frac{1}{4}, \frac{135}{512}, \frac{490}{512}, \frac{108}{256}$

REF: 018939siii

17 ANS:
$\frac{1}{10}, \frac{3}{10}, \frac{189}{1000}, \frac{37}{10,000}, \frac{992}{1000}$

REF: 089042siii