NAME:_____

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

1. fall9918b, P.I. A2.S.15
A fair coin is tossed 5 times. What is the probability that it lands tails up *exactly* 3 times?

[A] $10(\frac{1}{2})^3$ [B] $(\frac{1}{2})^3$

[C] $10(\frac{1}{2})^5$ [D] $\frac{3}{5}$

2. 010302b, P.I. A2.S.15
The probability that Kyla will score above a 90 on a mathematics test is $\frac{4}{5}$. What is the probability that she will score above a 90 on three of the four tests this quarter?

[A] $\frac{3}{4}(\frac{4}{5})^1(\frac{1}{5})^3$ [B] $\frac{3}{4}(\frac{4}{5})^3(\frac{1}{5})^1$

[C] ${}_4C_3(\frac{4}{5})^1(\frac{1}{5})^3$ [D] ${}_4C_3(\frac{4}{5})^3(\frac{1}{5})^1$

3. 010903b, P.I. A2.S.15
If the probability that the Islanders will beat the Rangers in a game is $\frac{2}{5}$, which expression represents the probability that the Islanders will win *exactly* four out of seven games in a series against the Rangers?

[A] $(\frac{2}{5})^4(\frac{3}{5})^3$ [B] ${}_7C_4(\frac{2}{5})^4(\frac{2}{5})^3$

[C] ${}_7C_4(\frac{2}{5})^4(\frac{3}{5})^3$ [D] ${}_5C_2(\frac{4}{7})^2(\frac{3}{7})^3$

4. 010805b, P.I. A2.S.15
Sean tells prospective clients that the probability of rain at the dive location is .2 each day. Which expression can be used to calculate the probability that it will rain on *exactly* 5 days of the 7 days at the dive location?

[A] ${}_7C_5(.5)(.7)$ [B] ${}_7C_5(.2)^2(.8)^5$

[C] ${}_7C_2(.5)(.7)$ [D] ${}_7C_5(.2)^5(.8)^2$

5. 060402b, P.I. A2.S.15
The Hiking Club plans to go camping in a State park where the probability of rain on any given day is 0.7. Which expression can be used to find the probability that it will rain on *exactly* three of the seven days they are there?

[A] ${}_7C_3(0.3)^3(0.7)^4$ [B] ${}_7C_3(0.7)^3(0.3)^4$

[C] ${}_4C_3(0.7)^3(0.7)^4$ [D] ${}_4C_3(0.4)^4(0.3)^3$

6. 060702b, P.I. A2.S.15
During a single day at radio station WMZH, the probability that a particular song is played is .38. Which expression represents the probability that this song will be played on *exactly* 5 days out of 7 days?

[A] ${}_5C_2(.38)^5(.62)^2$ [B] ${}_7C_5(.38)^2(.62)^5$

[C] ${}_7P_5(.38)^5(.62)^2$ [D] ${}_7C_5(.38)^5(.62)^2$

7. 080201b, P.I. A2.S.15
Which fraction represents the probability of obtaining *exactly* eight heads in ten tosses of a fair coin?

[A] $\frac{45}{1{,}024}$ [B] $\frac{180}{1{,}024}$

[C] $\frac{64}{1{,}024}$ [D] $\frac{90}{1{,}024}$

8. 060223b, P.I. A2.S.15
After studying a couple's family history, a doctor determines that the probability of any child born to this couple having a gene for disease *X* is 1 out of 4. If the couple has three children, what is the probability that *exactly* two of the children have the gene for disease *X*?

9. 080723b, P.I. A2.S.15
Mr. and Mrs. Doran have a genetic history such that the probability that a child being born to them with a certain trait is $\frac{1}{8}$. If they have four children, what is the probability that *exactly* three of their four children will have that trait?

10. 010524b, P.I. A2.S.15
If the probability that it will rain on any given day this week is 60%, find the probability it will rain *exactly* 3 out of 7 days this week.

11. fall9922b, P.I. A2.S.15
Jim can drive a golf ball over 220 yards 40% of the time. He regularly plays on a golf course where drives of that distance are needed on 12 holes. Determine the probability that *exactly* 7 of his drives will be over 220 yards.

12. 010625b, P.I. A2.S.15
During a recent survey, students at Franconia College were asked if they drink coffee in the morning. The results showed that two-thirds of the students drink coffee in the morning and the remainder do not. What is the probability that of six students selected at random, *exactly* two of them drink coffee in the morning? Express your answer as a fraction or as a decimal rounded to *four decimal places*.

13. 060625b, P.I. A2.S.15
Ginger and Mary Anne are planning a vacation trip to the island of Capri, where the probability of rain on any day is 0.3. What is the probability that during their five days on the island, they have *no* rain on *exactly* three of the five days?

14. 060122b, P.I. A2.S.15
At a certain intersection, the light for eastbound traffic is red for 15 seconds, yellow for 5 seconds, and green for 30 seconds. Find, to the *nearest tenth*, the probability that out of the next eight eastbound cars that arrive randomly at the light, exactly three will be stopped by a red light.

15. 080522b, P.I. A2.S.15
The Coolidge family's favorite television channels are 3, 6, 7, 10, 11, and 13. If the Coolidge family selects a favorite channel at random to view each night, what is the probability that they choose *exactly* three even-numbered channels in five nights? Express your answer as a fraction or as a decimal rounded to *four decimal places.*

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[1] C

[2] D

[3] C

[4] D

[5] B

[6] D

[7] A

[2] $\frac{9}{64}$, and appropriate work is shown, such as ${}_3C_2(\frac{1}{4})^2(\frac{3}{4})^1$.

[1] Only ${}_3C_2(\frac{1}{4})^2(\frac{3}{4})^1$ is shown.

or [1] Appropriate work is shown, but one computational error is made.

or [1] $\frac{9}{64}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[8] incorrect procedure.

[2] $\frac{28}{4096}$ or an equivalent answer, and appropriate work is shown, such as evaluating the expression ${}_4C_3(\frac{1}{8})^3(\frac{7}{8})^1$.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] The expression ${}_4C_3(\frac{1}{8})^3(\frac{7}{8})^1$ is written, but no further correct work is shown.

or [1] $\frac{28}{4096}$ or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[9] incorrect procedure.

[2] $\frac{15{,}120}{78{,}125}$ or 19.35% or an equivalent answer, and appropriate work is shown, such as ${}_7C_3(.6)^3(.4)^4$.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] A correct expression, such as ${}_7C_3(.6)^3(.4)^4$, is written, but no further correct work is shown.

or [1] An incorrect expression of equal difficulty is evaluated appropriately.

or

[1] $\frac{15{,}120}{78{,}125}$ or 19.35% or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[10] incorrect procedure.

[2] 0.1, 0.101, 0.099, or 10% or equivalent answer with appropriate work shown such as ${}_{12}C_7(0.4)^7(0.6)^5$.
[1] Finds an appropriate answer based on an incorrest value for one of the variables.
or [1] Makes correct substitutions, but has a rounding, percent conversion error, or arithmetic mistake.
or [1] Correct answer with no work shown.
or [1] Does not come to final answer, such as $792(\frac{128}{78125})(\frac{243}{3125})$.
[0] Response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[11]

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[2] $\frac{60}{729}$ or $\frac{20}{243}$ or .0823, and appropriate work is shown, such as ${}_6C_2(\frac{2}{3})^2(\frac{1}{3})^4$.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] A correct expression is written, such as ${}_6C_2(\frac{2}{3})^2(\frac{1}{3})^4$, but no further correct work is shown.
or [1] $\frac{60}{729}$ or $\frac{20}{243}$ or .0823, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[12]

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[2] .3087 or an equivalent answer, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as evaluating ${}_5C_3(0.3)^3(0.7)^2$.
or [1] .3087 or an equivalent answer, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[13]

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[2] 0.3 or an equivalent answer, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Appropriate work is shown, but no answer is found.
or [1] 0.3 or an equivalent answer, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[14]

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[2] $\frac{40}{243}$ or an equivalent fraction or .1646, and appropriate work is shown, such as ${}_5C_3(\frac{1}{3})^3(\frac{2}{3})^2$.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as finding the probability of choosing at least three even-numbered channels.
or [1] $\frac{40}{243}$ or an equivalent fraction or .1646, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[15]