

**GRADE 12 ESSENTIAL
MrF UNIT I - PROBABILITY
PRIOR PROVINCIAL EXAM QUESTIONS**

Name: _____

Date: _____

The following questions are extracts of Archived Provincial Exams. I have provided answers [only] at the end material to this package.

Full solutions and **exemplars** of common mistakes are available at:

<https://www.edu.gov.mb.ca/k12/assess/archives/#es>

[Standard Basic Directions]

DIRECTIONS

- _ Show all your work [mainly for you!] Show **complete answers** in the space(s) provided in this booklet [although in these practice questions you will likely need to do some questions on separate paper, however showing complete work and steps is important to **you!** Not just the teacher].
- _ Use the *Formula Sheet provided* and your study sheet [Cheat Sheet].
- _ Use a scientific calculator.
- _ Provide explanations and justifications where appropriate with proper sentences.
- _ Use a well-organized method to communicate your answer. [ie: be neat, organized, box the answer, answer in words, and units]
- _ Let the mark values for each question guide you in answering the question.
- _ Express answers in decimal **and** percentage form to **two decimal places** when rounding, unless otherwise indicated.

JAN 2016

Jan 2016 – 7. Emerito has to write a math quiz at the end of every week. Each quiz is out of 10 marks. His marks on the last 6 weeks' quizzes were as follows:

4	7	8	6	8	7
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State the probability that a randomly chosen quiz has a mark of 70% or more.

Jan 2016 - 8. **State** 63% as a fraction and as a decimal.

Fraction: _____

Decimal: _____

Jan 2016 - 9. A company wishes to advertise a new type of breakfast cereal by sending out small samples through the mail to potential customers. There is a 7% chance that a potential customer will like the cereal and buy a full box for \$6.00.

A) Calculate the expected value for the company if the samples cost \$0.40 each to produce and distribute.

B) Justify whether the company should try this form of advertising based on your answer in Part A.

Jan 2016 - 10. State the probability of a baseball player hitting a ball given that the odds for this event are 1:4.

Jan 2016 - 11. Ten cards, numbered 1 to 10, are placed in a bag. A student pulls a card from the bag, records the number, and puts the card back in the bag. The student repeats this process 9 more times. The table below shows the results.

3	6	8	4	4	1	10	6	2	5
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- A) State the experimental probability of a student pulling out a card with a number greater than 7.
- B) State the theoretical probability of a student pulling out a card with a number greater than 7.

Jan 16 - 12. Choose the letter that best completes the statement below. The probability of a tadpole surviving to become an adult frog is 90%. The odds **against** this happening are:

- a) 1:9 b) 9:1 c) 1:10 d) 10:1

Answer: _____

June 2016

Jun 2016 - 7. Josephine has placed 3 white, 5 blue, and 6 purple marbles in a bag.

- A) State the probability of randomly selecting a purple marble from the bag.
- B) A purple marble is pulled out of the bag and not replaced. State the probability of randomly selecting another purple marble from the bag.

Jun 2016 - 8. State the odds in favour of a tidal wave occurring given that the probability for this event is 3 out of 147.

Jun 2016 - 9. A game at a summer carnival costs \$2 to play. The prize at this game is a stuffed animal valued at \$10. The probability of winning the game is 27%.

A) Calculate the expected value (EV) for the game from the player's perspective.

B) Justify whether the owner of the game should continue offering it at the carnival based on your answer in Part A.

Jun 2016 - 10. State the probability of "13 out of 50" as a decimal and a percent.

Decimal: _____
Percent: _____

JAN 2017

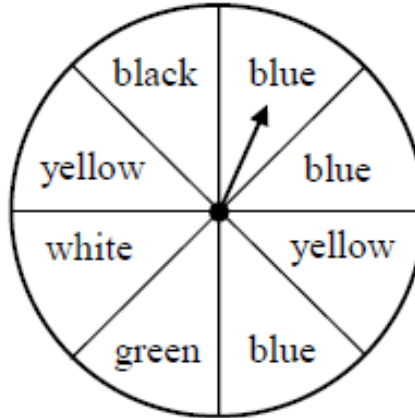
Jan 2017 - 8. A sports store sells lacrosse sticks. Out of 500 sold, 55 are defective. The manufacturer says that 5 out of 100 is the expected number of defective sticks.

- A) State the theoretical probability of a stick being defective.
- B) State the experimental probability of a stick being defective.

Jan 2017 - 9. The probability of winning a computer programming contract is 28%. The contract is worth \$12 000 but it costs \$2300 to prepare the contract.

Calculate the expected value (EV) of the contract.

Jan 2017 - 10. Given the following spinner:



- A) State the probability of the arrow landing on yellow.
- B) State the odds in favour of the arrow landing on blue.

Jan 2017 - 11. During a hockey season, 75 of the 400 games went into overtime.

State the odds **against** a game going into overtime.

Jan 2017 - 12. Choose the letter that best completes the statement below.

Probability compares the number of favourable outcomes to the:

- a) odds for the event
- b) odds against the event
- c) total number of outcomes
- d) theoretical probability

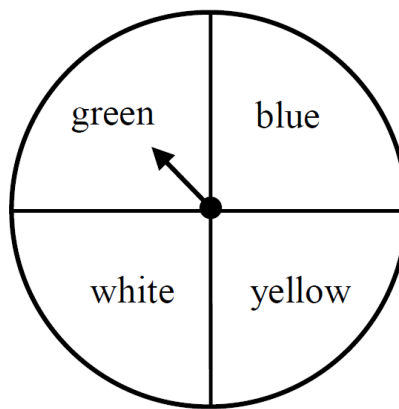
Jun 2017

Jun 2017 - 8. The probability of Jen winning a swimming race is 1 out of 7. State the probability of winning as a decimal and a percent.

Decimal: _____

Percent: _____

Jun 2017 - 9. The following spinner is divided into 4 colours.



The spinner was spun 40 times and the results are shown in the table below.

Colour	Number of Times
green	16
yellow	11
white	8
blue	5

A) State the experimental probability of spinning white.

B) State the theoretical probability of spinning white.

Jun 2017 - 10. The probability of a baseball team winning a tournament is 15%. The entry fee is \$200. If they win the tournament, the team will receive a cash prize of \$1,000. Calculate the expected value (EV).

Jun 2017 - 11. Akuna is the manager of an assembly line that makes compact fluorescent light bulbs. Workers on the assembly line randomly chose 250 light bulbs to test and found 1 defective light bulb.

A) State the experimental probability, in fraction form, of a light bulb being defective.

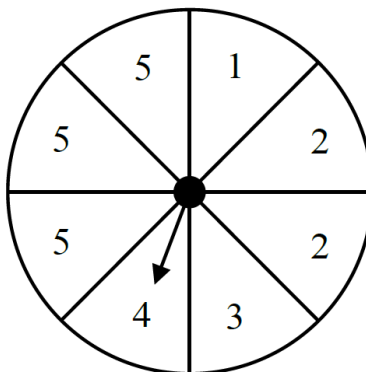
B) State the number of defective light bulbs that are expected in a shipment of 5000 light bulbs.

Jun 2017 - 12. The odds against hitting a deer on the highway each year are **49 : 1**.

State the probability of hitting a deer this year.

JAN 2018

JAN 2018 - 8. Given the following spinner:



- A) State the probability, in fraction form, of the spinner landing on 4.
- B) State the probability, as a percent, of the spinner landing on a number less than 4. [$P(\text{spin} < 4)$]

JAN 2018 - 9. A company states that the theoretical probability of manufacturing a defective calculator is 1.3%. Natalie samples 200 calculators and finds that 4% of them are defective. She immediately takes a second sample of 1000 calculators and finds that 1.8% of them are defective.

Natalie's Results

	Sample Size	Percent Defective
Sample 1	200	4%
Sample 2	1000	1.8%

Explain why her second sample is closer to the theoretical probability than her first.

JAN 2018 - 10. The probability of being selected as a jury member is 0.07. Calculate the probability, in decimal form, of **not** being selected.

JAN 2018 - 11. State the odds against a soccer game ending in a tie score if the probability of a tie is $\frac{9}{225}$.

JAN 2018 - 12. The probability of having green eyes is 3 out of 25. Calculate the expected number of people who have green eyes in a group of 150 people.

JAN 2018 - 13. "*Pick the Marble*" is a game that involves picking one marble out of a bag. In the bag, 32% of the marbles are red, 4% are green, and 64% are blue. It costs \$2 to play, and the prizes are listed in the table below.

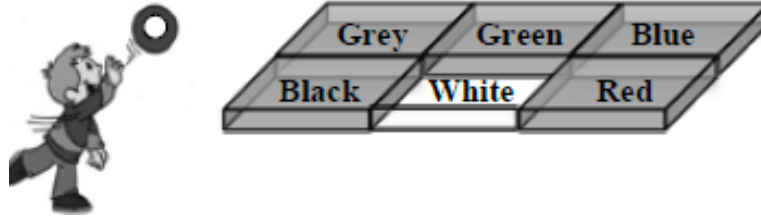
Pick the Marble

Colour	Probability of Winning	Prizes
Red	32%	Stuffed animal valued at \$10
Green	4%	Stuffed animal valued at \$15
Blue	64%	Nothing

Calculate the expected value for the game.

June 2018

Jun 2018 - 8. A ring is tossed into one of six boxes. With each toss, there is an equal chance for the ring to land in any one of the boxes.



The ring is tossed 100 times with the following results:

Box	Number of times
White	22
Not White	78

- A) State the theoretical probability of tossing a ring into the white box.
- B) State the experimental probability of the ring not landing in the white box.

Jun 2018 - 9. The probability of being born with one extra finger or toe is approximately 1 out of 500.

Calculate the probability as a percent.

Jun 2018 - 10. Stephanie offers horse drawn carriage tours. It costs her \$30 per day for feed and care of the horses. Each day she will operate either a premium tour, a standard tour, or no tour at all. The table below shows the fee for each tour and the probability it will occur each day.

Tour	Fee for the Tour	Probability
Premium	\$100	10%
Standard	\$50	50%
No tour	\$0	40%

Calculate Stephanie's daily expected value.

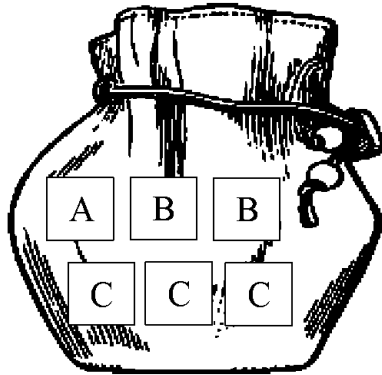
Jun 2018 - 11. In many soccer leagues, the odds in favour of scoring on a penalty kick are 7 to 3.

State the probability, in fraction form, of not scoring on a penalty kick.

Jun 2018 - 12. Jose cuts down 60 trees per month. Each time he cuts down a tree, there is a 1% probability that he will need to repair his chainsaw.

Calculate how many times Jose should expect to repair his chainsaw in one year.

Jun 2018 - 13. A bag contains the following tiles:



David removes one **B** tile from the bag and does not return it. He then randomly removes a second tile.

State the odds in favour of this second tile being **C** .

A few selected formulae:

$$\text{Prob}(A) = \frac{n(A)}{n(s)} = \frac{\text{number of event } A}{\text{total number in sample space}}$$

$$\text{Prob}(\bar{A}) = 1 - \text{Prob}(A); \quad \text{Prob}(A) + \text{Prob}(\bar{A}) = 1$$

Odds in Favour of Event A \rightarrow number of Event A : number of NOT Event A
 $A : \bar{A}$

Odds Against Event A \rightarrow number of NOT Event A : number of Event A
 $\bar{A} : A$

$$EV = P(\text{win}) \bullet \$\text{gain} - P(\text{lose}) \bullet \$\text{loss}$$

ANSWERS**Jan 2016**

7. $4/6$ or $2/3$ or 0.67 or 66.67% or 4 out of 6 or 2 out of 3; etc.
[but preferred that any fraction answers are properly reduced]

8. $63/100$ 0.63

9. $EV = \$0.02$; Yes. $EV > 0$

10. $1/5$ or 0.2 or 20% or 1 out of 5

11. $2/10$ or 0.20 or 20% or 2 out of 10

12. a)

Jun 2016

7. A) $6/14$ or $3/7$ or 0.43 or 43% or 3 out of 7

B) $5/13$ or 0.38 or 38% or 5 out of 13.

8. 3:144 or 3 to 144

9. A) $\$0.70$ B) possible ans: No, it has a negative EV for the owner

10. 0.26 26%

Jan 2017

7. $43/100$; 0.43

8. A) $5/100$ or 0.05 or 5% or five out of one hundred

B) $55/500$ or $11/100$ or 0.11 or 11% or fifty-five out of five hundred

9. $\$1,060$

10. A) $2/8$ or $1/4$ or 0.25 or 25% or two out of eight

B) 3:5 or 3 to 5

11. 325 : 75 or 325 to 75 or we will always accept proper reduced ratios and fractions: eg: 13 : 3

12. c.

Jun 2017

8. 0.14 ; 14.29% [Make sure you follow instructions! They said to round all decimal and percentage answers to nearest 0.01]

9. A) $1/5$ or 0.2 or 20% or one out of five

B) $1/4$ or 0.25 or 25% or one out of four

10. $-\$50$ [Negative $\$50$]

11. $1/250$; 20 bulbs
12. $1/50$ or 0.02 or 2% or 1 out of 50

JAN 2018

8. A) $1/8$ B) 50%
9. The larger sample should be closer to the theoretical probability.
10. 0.93
11. 216 : 9 or 216 to 9
12. 18 people
13. \$1.80

JUN 2018

8. A) $1/6$ or 0.17 or 16.67% or one out of six
B) $78/100$ or 0.78 or 78% or seventy-eight out of one hundred
9. 0.2% [well actually 0.20% if you are showing the proper precision]
10. EV = \$5. [She can expect, on an average day, to probably make \$5]
11. $3/10$
12. 7.2 repairs (so of course you might call it 7 whole repairs, or 8 repairs)
13. 3:2 or 3 to 2 or three to two

There are lots more questions with **full worked solutions** and **exemplars** showing common mistakes on the Manitoba Education website:

<https://www.edu.gov.mb.ca/k12/assess/archives/#es>