GRADE 12 APPLIED
UNIT A – PROBABILITY
ODDS OF AN EVENT

Name: _____
Date: _____

There is more than one way to express the chance of something happening or not happening! We know that:

$$\text{Probability of A} = \frac{\#\ of\ favourable\ outcomes\ 'A'}{\#\ of\ total\ possible\ outcomes\ 'n'} = \frac{n(A)}{n(total)}$$

Odds is basically the same but instead of comparing **what you want** with what **you could have**, you are comparing **what you want** to what you **don't want**! Just that easy!

There are **two forms** of odds:

Odds in Favour of something happening:

# of favourable outcomes : # of *un*favourable outcomes

Odds Against something happening:

of *un*favourable outcomes : # of favourable outcomes

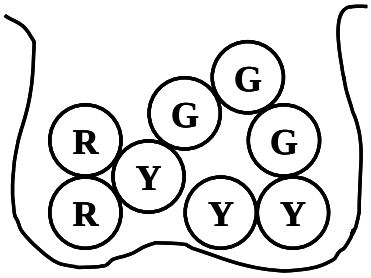
Notice we tend to not write odds as a fraction but as a ratio with a colon symbol, " **:** ", especially to avoid confusion with the probability ratio. Or some time just the word '**to**'.

Express all probabilities as fractions and as percents. Round decimal values to the nearest 0.01 (as usual).

Show all work, as if you were explaining it to your 12 year old niece or nephew.

Just 'stating' an answer, without showing how it was determined, seldom gets any marks.

Example: If the favourable event is drawing a Green marble from the bag then we would have a result that:



$P(\text{Green}) = \frac{\#\text{ of Green marbles}}{\#\text{ Total marbles}}$

$= \frac{3}{8} = 37.5\% = 0.375$

Odds in Favour = #Green : #Not Green

= 3 : 5

Odds Against = #Not Green : #Green

= 5 : 3

1. Kyla has four different dollies. Her favourite is Misha. There are 24 possible ways Kyla can randomly line up all the different dolls on a shelf.

   a. Calculate how many arrangements of the dolls are there that Misha is on the left.
   b. Determine the **Probability** that Misha is on the left.
   c. Determine the **Odds in Favour** of Misha being on the left.

How did we know there was 24 ways?

2. The weather network says there is a 30% probability of rain.

   a. Determine the **Odds in Favour** of rain

   b. Determine the **Odds Against** rain.

3. On a quiz out of 10 marks, the scores of several students were as follows: 3, 4, 6, 7, 7, 8, and 10. A school inspector comes by and wants to randomly sample one student's quiz. Determine the **Odds in Favour** of a randomly selected quiz being greater than 50%.

4. The Odds Against an event occurring are 1 to 5. Express the **probability** for the event occurring.

5. Describe a situation that would have favourable odds (ie: odds in favour) of **5 : 2.**

6. Express the annual probability (in any particular year) of there being an October snowstorm somewhere in Manitoba if the Odds For this occurrence are **3 to 1**.

7. Using a proper written paragraph explain the difference between odds and probability. Often a diagram helps to further explain something too!

8. The City of Selkirk is planning a Fun Day.

a. The probability of it raining on Fun Day is **3 out of 20**. Determine the odds that it will **not** rain on Fun Day.

b. The **Odds For** winning a prize at each play of the 'water pistol' game are **4 : 5**. Determine the probability of winning a prize on any play.

c. With **Odds For** winning the water pistol game of **4 : 5**, your child plays 18 games; how many prizes does your child win?

* Students are always expected to show the method that is used to solve a problem! Simply stating an answer with no support gets no mark.

9. **Sports Betting**. The **Odds Against** a certain horse to **Win** a race (as opposed to '**Place'** [2nd place] or '**Show'** [3rd place]) is listed in the race program as **8 : 5**.

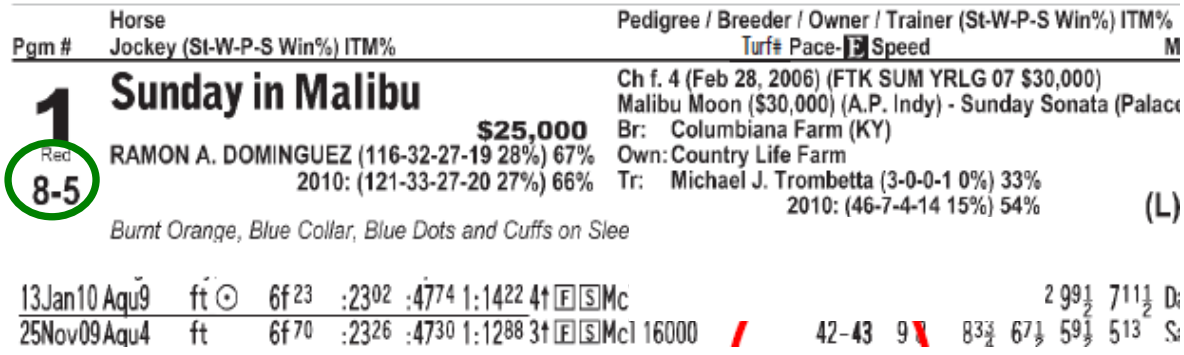
a. Determine the **probability** the horse will **win**.

b. **Sports Betting**. If the winnings for the '**Win Pool**' are distributed fairly, how much would you '*win*' for a normal **$2.00** wager. Here is a formula for that type of sports betting:

Total Payout = $stake * \frac{Not\ Win}{Win} + stake$ = _____

But of course, the event organizers skim about (~) 15% of the pool off the top so the payout is likely a bit less. Likely about (~) $4.70 total payout. So, no matter what, **you will lose overall** after a day of 10 races.

Example Entry in a Race Program:



Pgm #	Horse Jockey (St-W-P-S Win%) ITM%	Pedigree / Breeder / Owner / Trainer (St-W-P-S Win%) ITM% Turf♯ Pace-E Speed M
1 Red 8-5	**Sunday in Malibu** $25,000 RAMON A. DOMINGUEZ (116-32-27-19 28%) 67% 2010: (121-33-27-20 27%) 66% *Burnt Orange, Blue Collar, Blue Dots and Cuffs on Slee*	Ch f. 4 (Feb 28, 2006) (FTK SUM YRLG 07 $30,000) Malibu Moon ($30,000) (A.P. Indy) - Sunday Sonata (Palace Br: Columbiana Farm (KY) Own: Country Life Farm Tr: Michael J. Trombetta (3-0-0-1 0%) 33% 2010: (46-7-4-14 15%) 54% (L)

13Jan10 Aqu9	ft ⊙	6f 23	:23 02	:47 74	1:14 22	4†	F	S	Mc									2 9 9½	7 11½	D:
25Nov09 Aqu4	ft	6f 70	:23 26	:47 30	1:12 88	3†	F	S	Mcl 16000	/	42-43	9		8 3¾	6 7½	5 9½	5 13	S:			

10. Determine the chances described in the table below and **state** the answers in the blanks. Reduce fractions and ratios to simplest form.

Probability of Event [%]	**Probability Fraction**	**Odds in Favour of Event**	**Odds Against Event**
20%	$\frac{20}{100} = \frac{2}{10} = \frac{1}{5}$	1 "WIN"	4 "NOT WIN"
90%			
5%			
8.5%			
		4 : 1	
		1 to 1	
		1 : 3	
			5:9
			3:1
			4:5
	$^{3}/_{4}$		
	$^{5}/_{8}$		
Make up your own			
Optional →		**m : n**	