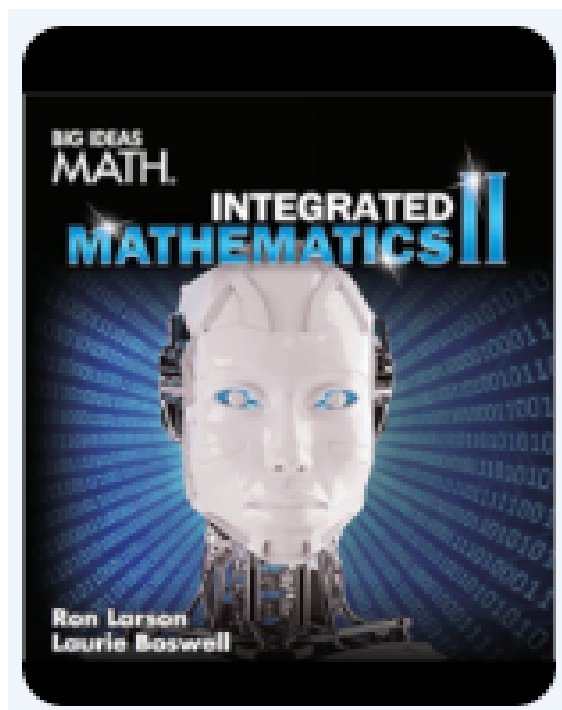


REQUIRED Mathematics Summer Review Packet

For
ALL Students Entering
Integrated Math II HONORS
From
Integrated Math I CP

Due Date: Friday, August 16, 2024

Please send your work on this packet to
fkhan@medford.k12.ma.us by the above deadline.



Medford Public Schools
Department of Mathematics

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Faiza I Khan

Director of Mathematics K - 12

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June 1, 2024

Dear Student/Parent/Guardian:

Welcome to your Summer Mathematics Review Packet, which is **required** if you are moving from Integrated Math I CP to Integrated Math II Honors. **You must complete this packet, scan and send it to fkhan@medford.k12.ma.us by Friday Aug 16, 2024.**

The Integrated Math I Honors course students take in their freshman year has some extra standards to ensure students succeed in the Integrated Math II Honors course. This packet coers those standards since the students in Algebra I CP haven't had exposure and/or practice on those standards. In today's rigorous environment of academic standards with the newly implemented Common Core, students need to understand core topics to progress in their mathematical learning in an Honors course. This **REQUIRED** packet is intended to help students come on par with their peers who have taken the Integrated Math I Honors course in their freshman year.

Students, please note that all honors classes are fast-paced and not only cover more concepts but also cover concepts in greater depth than their College Prep (CP) counterparts. You will need to spend some time this summer preparing for the class. It is important to remember that maintaining academic integrity is incredibly important to your overall success in the course and life. You need to LEARN the material in this packet by watching the linked videos and completing the following practice problems. You are also expected to show your hand-written work completely in the space provided (or attach extra paper when needed). **Just providing answers is not sufficient.** You are expected to complete this packet FULLY by August 16, scan your work on this packet and any other sheet and send it to me at the email address above. DO NOT USE PHOTOMATH OR SIMILAR APPS to complete this, as it will not prepare you conceptually and mentally for an honors-level math class. If you do not understand any portion of the packet, please do not use any other means; plan to stay after school during the first two weeks with your teacher to learn and review.

Good luck as you transition to high school. We look forward to seeing you at MHS.

Sincerely,

Faiza Khan

Director of Mathematics K - 12

Medford Public Schools

Name: _____

Part 1: Sample Spaces and Probability

Videos to watch:

<https://www.youtube.com/watch?v=KzfwUEJjG18> (This is a basic video on probability from Math Antics.)

<https://www.youtube.com/watch?v=ynjHKBCiGXY> (This is a video on Sample Space and an Introduction to Probability.)

<https://www.youtube.com/watch?v=0T-CaQCISf4> (This is a video on Probability of Complementary Events & Sample Space.)

Problems to complete:

1) Your friend has two standard decks of 52 playing cards and asks you to randomly draw one card from each deck. What is the probability that you draw two spades?

2) Refer to the spinner shown. The spinner is divided into sections with the same area.



a) What is the theoretical probability that the spinner stops on a multiple of 3?

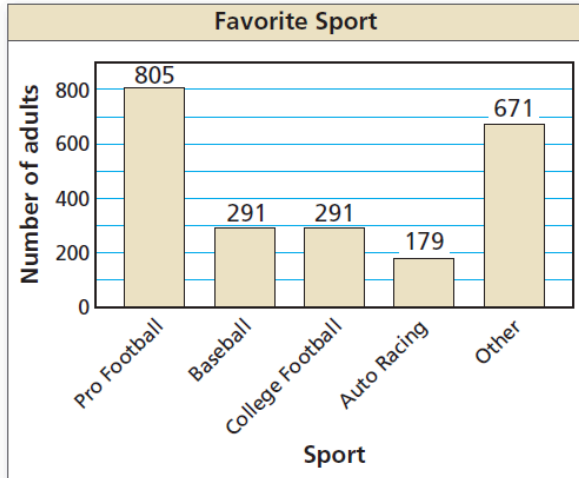
b) You spin the spinner 30 times. It stops on a multiple of 3 twenty times. What is the experimental probability of stopping on a multiple of 3?

c) Explain why the probability you found in part (b) is different than the probability you found in part (a).

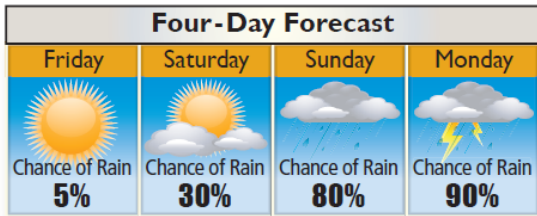
d) You spin the spinner 60 times. It stops on a multiple of 10 six times. How does the experimental probability of stopping on a multiple of 10 compare to the experimental probability of stopping on a multiple of 10.

3) The odds of winning a lottery game are 3 : 5. The probability of winning a bingo game is 35%. Which game gives you a better chance of winning? Explain.

4) A survey of 2237 adults ages 18 and over asked which sport is their favorite. The results are shown in the figure below. What is the probability that an adult chosen at random prefers auto racing?



5) Refer to the chart below.



a) Order the following events from least likely to most likely.

- A. It rains on Sunday.
- B. It does not rain on Saturday.
- C. It rains on Monday.
- D. It does not rain on Friday.

b) Find the odds in favor of rain for each day.

Part 2: Independent and Dependent Events

Videos to watch:

<https://www.youtube.com/watch?v=LS-ihDKr2M> (This is a video on Independent vs. Dependent events.)

<https://www.youtube.com/watch?v=CKnPKgOvals> (This is a basic video from Brain Pop describing the difference between independent and dependent events.)

<https://www.youtube.com/watch?v=6wi0gjf60Y> (This is a video which teaches how to find the probability of independent and dependent events.)

Problems to complete:

6) Tell whether the events are independent or dependent. Explain your reasoning. You roll a six-sided die and flip a coin.
Event A: You get a 4 when rolling the die.
Event B: You get tails when flipping the coin.

7) You have one red apple and three green apples in a bowl. You randomly select one apple to eat now and another apple for your lunch. Use a sample space to determine whether randomly selecting a green apple first and randomly selecting a green apple second are independent events.

8) Events A and B are independent. Suppose $P(B) = 0.4$ and $P(A \text{ and } B) = 0.13$. Find the $P(A)$.

9) Events A and B are dependent. Suppose $P(B|A) = 0.6$ and $P(A \text{ and } B) = 0.15$. Find the $P(A)$.

10) The table shows the number of species listed as endangered and threatened in the United States.

	Endangered	Threatened
Mammals	70	16
Birds	80	16
Other	318	142

a) Find the probability that a randomly selected endangered species is a bird.

b) Find the probability that a randomly selected mammal is endangered.

11) At a school, 43% of students attend the homecoming football game. Only 23% of students go to the game and the homecoming dance. What is the probability that a student who attends the football game also attends the dance?

Part 3: Two-Way Tables and Probability

Videos to watch:

<https://www.youtube.com/watch?v=U785Y-QI-K8> (This is a short video which explains how to fill-in two-way tables.)

<https://www.youtube.com/watch?v=IT7H0FcyIZc> (This video covers a few examples of filling in a two-way table and using the information from the two-way table to find the probabilities of specific events happening.)

<https://www.youtube.com/watch?v=PBxZ198gZqo> (This short video explains how to fill-in a two-way table and how to find the probability of a given event taking place.)

<https://www.youtube.com/watch?v=l5MrtV7ZN88> (This is a Khan Academy video explaining the concepts of two-way tables and Venn diagrams related to the idea of probability.)

Problems to complete:

12) Complete the two-way table. Then find and interpret the marginal frequencies.

		Response		Total
		Yes	No	
Role	Student	56		
	Teacher		7	10
Total			49	

13) A survey finds that 110 people ate breakfast and 30 people skipped breakfast. Of those who ate breakfast, 10 people felt tired. Of those who skipped breakfast, 10 people felt tired. Make a two-way table that shows the conditional relative frequencies based on the breakfast totals.

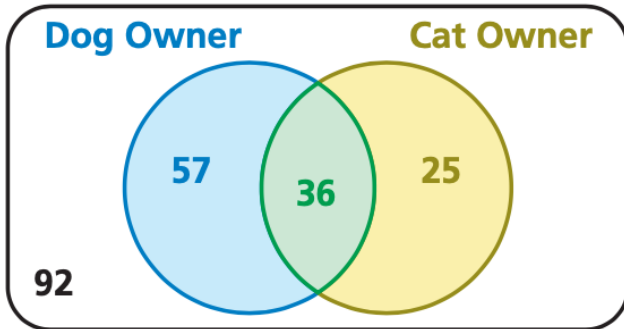
14) Three different local hospitals in New York surveyed their patients. The survey asked whether the patient's physician communicated efficiently. The results, given as joint relative frequencies, are shown in the two-way table.

		Location		
		Glens Falls	Saratoga	Albany
Response	Yes	0.123	0.288	0.338
	No	0.042	0.077	0.131

- What is the probability that a randomly selected patient located in Saratoga was satisfied with the physician's communication?
- What is the probability that a randomly selected patient who was not satisfied with the physician's communication is located in Glens Falls?
- Determine whether being satisfied with the communication of the physician and living in Saratoga are independent events.

15) A survey asks students whether they prefer math or science classes. Of the 150 male students surveyed, 62% prefer math class over science class. Of the female students surveyed, 74% prefer math. Construct a two-way table to show the number of students in each category if 350 students were surveyed.

16) Use the Venn diagram to construct a two-way table. Then use your table to answer the questions.



- a) What is the probability that a randomly selected person does not own either pet?

- b) What is the probability that a randomly selected person who owns a dog also owns a cat?

Part 4: Probability of Disjoint and Overlapping Events

Videos to watch:

<https://www.youtube.com/watch?v=ANVQAKQb8pY> (This video explains Disjoint vs. Overlapping events and also shows how to solve probability problems using these two methods/concepts.)

<https://www.youtube.com/watch?v=63LIDocOwHg> (This video covers many examples of finding probabilities of Disjoint and Overlapping events.)

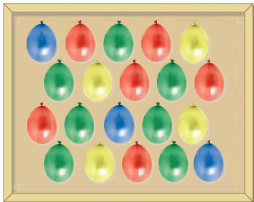
https://www.youtube.com/watch?v=_rTjRiyVBT8 (This video describes how to identify whether an event is disjoint or overlapping.)

Problems to complete:

In number 25 and 26, events A and B are disjoint. Find $P(A \text{ or } B)$.

17) $P(A) = 0.3$, $P(B) = 0.1$

18) Your dart is equally likely to hit any point inside the board shown. You throw a dart and pop a balloon. What is the probability that the balloon is red or blue?



19) You and your friend are among several candidates running for class president. You estimate that there is a 45% chance you will win and a 25% chance your friend will win. What is the probability that you or your friend win the election?

For number 20 and 21, you roll a six-sided die. Find $P(A \text{ or } B)$.

20) Event A : Roll a 6
Event B : Roll a prime number

21) Event A : Roll an odd number
Event B : Roll a number less than 5

Part 5: Permutations and Combinations

Videos to watch:

<https://www.youtube.com/watch?v=0NAASciUm4k> (This video explains the basics of Permutations and Combinations.)

<https://www.youtube.com/watch?v=XPPYYM6WCuE&t=62s> (This video teaches how to come up with numerical answers to Permutation and Combination problems. It also explains how to decide whether Permutations need to be used, or if Combinations needs to be used.)

https://www.youtube.com/watch?v=NEGxh_D7yKU (This video shows how to use Permutations and Combinations.)

Problems to complete:

22) Find the number of ways you can arrange (a) all the letters and (b) 2 of the letters in a given word: WATER

23) Evaluate the expression.

$${}_5P_2$$

24) Eleven students are competing in an art contest. How many different ways can the students finish first, second, and third?

25) Count the possible combinations of r letters chosen from the given list.

U, V, W, X, Y, Z; $r = 3$

26) Evaluate the expression.

$${}_8C_5$$

27) You want to purchase vegetable dip for a party. A grocery store sells 7 different flavors of vegetable dip. You have enough money to purchase 2 flavors. How many combinations of 2 flavors of vegetable dip are possible?

28) Tell whether the question can be answered using permutations or combinations. Explain your reasoning. Then answer the question.

To complete an exam, you must answer 8 questions from a list of 10 questions. In how many ways can you complete the exam?

29) You work 5 evenings each week at a bookstore. Your supervisor assigns you 5 evenings at random from 7 possibilities. What is the probability that your schedule does not include working on the weekend?

30) Find the probability of winning a lottery if you must correctly select 6 numbers, each an integer from 0 to 49. Assume the lottery numbers are selected at random and that the order is not important.

Part 6: Binomial Distributions

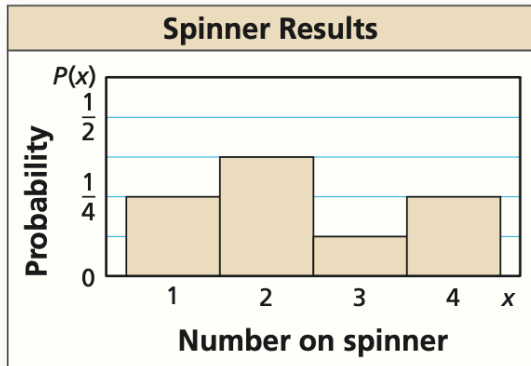
Videos to watch:

<https://www.youtube.com/watch?v=WWv0RUxDfbs> (This is a video from Khan Academy which teaches Binomial Distribution.)

<https://www.youtube.com/watch?v=rvg9oUHtX50> (This video goes over Binomial Distribution and some selected examples.)

Problems to complete:

31) Use the probability distribution to determine (a) the number that is most likely to be spun on a spinner, and (b) the probability of spinning an even number.



32) According to a survey, 27% of high school students in the United States buy a class ring. You ask 6 randomly chosen high school students whether they own a class ring.

- Draw a histogram of the binomial distribution for your survey.
- What is the most likely outcome of your survey?
- What is the probability that at most 2 people have a class ring?

Part 7: Matrices

Videos to watch:

<https://www.youtube.com/watch?v=WR9qCSXJlyY> (This is a Khan Academy video on how to perform matrix addition and subtraction.)

<https://www.youtube.com/watch?v=o6tGHLkZvVM> (This is an introduction video to matrix multiplication.)

<https://www.youtube.com/watch?v=RE-nDY2aWso> (This is a 'part 2' follow-up to the previous introduction video on matrix multiplication.)

<https://www.youtube.com/watch?v=AMLUikdDQGk> (This video introduces inverse matrices and how to find them.)

Problems to complete:

33) State the dimensions of each matrix.

a)
$$\begin{bmatrix} 6 & 1 \\ 0 & 7 \\ -5 & 11 \end{bmatrix}$$

b)
$$\begin{bmatrix} -8 & 7 & 3 \\ 6 & -1 & 9 \\ 0 & 11 & 5 \\ 1 & 7 & 3 \end{bmatrix}$$

For #34 & 35, use the matrices below to perform each operation, if possible.

$$A = \begin{bmatrix} 1 & -4 \\ 5 & 3 \\ -7 & -1 \\ 8 & 2 \end{bmatrix}, B = \begin{bmatrix} 0 & 3 \\ -8 & 6 \\ 1 & -2 \\ -7 & -5 \end{bmatrix}, C = \begin{bmatrix} 4 & -3 & 9 & 2 \\ 7 & -9 & 0 & 6 \end{bmatrix}, D = \begin{bmatrix} 11 & 7 & -2 & 0 \\ 8 & -5 & 1 & 10 \end{bmatrix}, E = \begin{bmatrix} 5 & -1 \\ 7 & 2 \\ -4 & -9 \\ 13 & 3 \end{bmatrix}$$

34) $A + B$

35) $3E$

36) Jordan Manufacturing has two factories, each of which manufactures three products. The number of products is represented in matrix A where the columns represent the two factories and the rows represent the three products.

$$A = \begin{bmatrix} 120 & 70 \\ 150 & 110 \\ 80 & 160 \end{bmatrix}.$$

If production levels are increased by 10%, write the new production levels as a matrix B . How is B related to A ?

For #37 & 38, find each product of the matrices, if possible.

37)

$$\begin{bmatrix} 3 & -5 \\ 7 & 1 \end{bmatrix} \cdot \begin{bmatrix} 2 & 2 & -4 & -7 \\ 8 & 1 & 3 & 0 \end{bmatrix}$$

38)

$$\begin{bmatrix} 7 & 11 & 2 \\ -6 & 0 & -9 \\ 10 & -4 & 5 \end{bmatrix} \cdot \begin{bmatrix} 5 \\ -3 \\ -1 \end{bmatrix}$$

39) A company sells four types of printers at three retail stores. Matrix S represents the number of each type of printer (the columns) sold at each store (the rows).

$$S = \begin{bmatrix} 16 & 10 & 8 & 12 \\ 12 & 0 & 10 & 4 \\ 4 & 12 & 0 & 8 \end{bmatrix}.$$

The wholesale (first column) and retail (second column) price of each model is represented by matrix P , with each row representing each store.

$$P = \begin{bmatrix} \$180 & \$269.99 \\ \$275 & \$399.99 \\ \$355 & \$499.99 \\ \$590 & \$799.99 \end{bmatrix}.$$

Find the product of SP . What does the product represent?

For number 40 & 41, find the determinant of each matrix.

$$40) \begin{bmatrix} 7 & -12 \\ -1 & -7 \end{bmatrix}$$

$$41) \begin{bmatrix} 6 & -5 \\ 11 & -9 \end{bmatrix}$$

For number 42 & 43, determine whether each pair of matrices are inverses. Find the inverse if it exists.

$$42) X = \begin{bmatrix} 3 & 4 \\ 0 & -2 \end{bmatrix}, Y = \begin{bmatrix} \frac{1}{3} & \frac{2}{3} \\ 0 & -\frac{1}{2} \end{bmatrix}$$

$$43) P = \begin{bmatrix} 8 & 6 \\ 7 & -5 \end{bmatrix}, Q = \begin{bmatrix} -\frac{5}{2} & -3 \\ \frac{7}{2} & 4 \end{bmatrix}$$