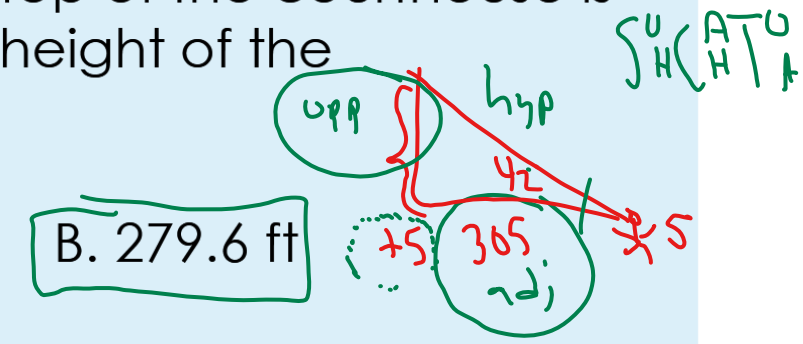
A surveyor is 305 feet from the base of the new courthouse. Her eye height is 5 feet above ground. The angle of elevation to the top of the courthouse is 42°. What is the height of the courthouse?

A. 204.1 ft

B. 279.6 ft

C. 338.7 ft

D. 343.7 ft



$\tan(42) = \frac{x}{305}$

$x = 305 \tan(42)$

$\approx 274.62 + 5 = 279.6$ ft

Working with Formulas

- ★Substitute in the information you have in to the *appropriate* formula.
- ★Solve for the missing piece.
- ★Use your algebra skills.

PROBABILITY FORMULAS

OR

- **Mutually Exclusive**
  - $P(A \cup B) = P(A) + P(B)$

And

- **Independent**
  - $P(A \cap B) = P(A) \bullet P(B)$

OR

- **Overlapping**
  - $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

And Conditional probability

- **Dependent**
  - $P(A \cap B) = P(A) \bullet P(B \mid A)$

Example 1 – Dependent

$P(A \cap B) = P(A) \cdot P(B \mid A)$

L: Chem
☺: Calculus

The probability of Sam getting an A on the Chemistry test is **0.76**. The probability of him getting an A on his Calculus test **and** an A on his Chemistry test is **0.494**. What is the probability of him getting an A on his Calculus test **given that** he got an A on his Chemistry test?

$P(L) = .76$

$P(L \cap ☺) = .494$

$$P(☺ \mid L) = \frac{P(L \cap ☺)}{P(L)} = \frac{P(L) \cdot P(☺ \mid L)}{P(L)}$$

$$P(☺ \mid L) = \frac{.494}{.76}$$

$$P(☺ \mid L) = .65$$

Example 2 – Independent

$P(A \cap B) = P(A) \bullet P(B)$

An optional camp to improve players' basketball skills was held in the county. The probability of a kid attending was **0.62**. The probability that they attended **and** made the honor roll was **0.44**. What is the probability that they made the honor roll?

A = attend
P(A) = .62
H = honor
P(A ∩ H) = .44
P(H) = x

$P(A \cap H) = P(A) \cdot P(H)$

$\frac{.44}{.62} = \frac{(.62) \cdot x}{.62}$

$x = P(H) = .71$

Example 3 – Overlapping (Inclusive)

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

- $P(A) = 1/4$
- $P(B) = 5/8$
- $P(A \cup B) = 3/4$
- Find $P(A \cap B)$

$P(A \cap B) = X$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$8\left(\frac{3}{4}\right) = 8\left(\frac{1}{4} + \frac{5}{8} - \frac{X}{1}\right)$

Common denominators

$6 = 2 + 5 - 8X$

$6 = 7 - 8X$

$-7 \quad -7$

$\frac{-1}{-8} = \frac{-8X}{-8}$

$\frac{1}{8} = X$ or $.125 = X$

Plug in values and solve.

or decimals

$.75 = .25 + .625 - X$

$.75 = .875 - X$

$-.875 \quad -.875$

$-.125 = -X$

GSE Geometry Unit 6 – Probability

Name: _____ Date: _____

Using Probability Formulas and Working Backwards

Mutually Exclusive: $P(A \cup B) = P(A) + P(B)$
Overlapping: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Independent: $P(A \cap B) = P(A) \bullet P(B)$
Dependent: $P(A \cap B) = P(A) \bullet P(B \mid A)$

1. For two events A and B, it is known that P(A) = 0.20, P(B) = 0.40 and P(A ∪ B) = 0.50. Find P(A ∩ B)

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$.5 = .2 + .4 - P(A \cap B)$
$.5 = .6 - P(A \cap B)$
$P(A \cap B) = .1$

2. For two events X and Y, it is known that P(X) = 2/5 and P(X ∩ Y) = 1/5. Find P(Y | X).

3. For two events B and C, it is known that P(C | B) = 0.61 and P(C ∩ B) = 0.48. Find P(B).

$P(B \cap C) = P(B) \cdot P(C \mid B)$
$.48 = P(B)(.61)$
$P(B) = .79$

4. Suppose that the probability of Eirik coming to a party is 80% and the probability of Emma coming to a party is 95%. Assuming that these events are independent, what is the probability that they both will come to a party?

$P(A \cap B) = (.8)(.95) = .76$

5. The probability of playing basketball is 12%, and the probability of playing both basketball and football is 5%. What is the probability of a person playing football, given they play basketball?

6. Joel and Rico play basketball. The probability that Joel makes a 3 pointer is 64%. The probability that Rico makes a 3 pointer is 87.5%. The probability of at least one of them making a 3 pointer is 95.5%. What is the probability, as a percent, that both Joel and Rico will make a 3 pointer?

GSE Geometry Unit 6 – Probability

Name: _____ Date: _____

Probability Review: Venn Diagrams, Tables, & Words

The table below represents a table about upperclassmen's suggestions for a class activity.

	Talent Show	Field Trip	Dance
10th	4	9	2
11th	6	3	5
12th	3	4	9

_____ 1. Find P(Dance)

_____ 2. Find P(10th ∪ Dance)

_____ 3. Find P(Field Trip ∩ 11th)

_____ 4. Find $P(\overline{12^{th} \cap \text{Talent Show}})$

_____ 5. Find P(10th | Field Trip)

_____ 6. Are the events Field Trip and 11th independent?

_____ 7. Which of the following pair of events are **independent**?

A. P(A) = 0.08; P(B) = 0.4; P(A ∩ B) = 0.32

B. P(A) = 0.30; P(B) = 0.15; P(A ∩ B) = 0.045

C. P(A) = 0.16; P(B) = 0.24; P(A ∩ B) = 0.30

The sum of 2 dice

_____ 8. P(even sum or a sum greater than 8)

_____ 9. P(sum less than 5 or a sum greater than 8)

Calendar – A month is chosen from a year

_____ 10. Find the probability of choosing a month that begins with a vowel.

_____ 11. Find the probability of choosing a month starting with the letter M or J.

_____ 12. Find the probability of selecting a month that begins with a consonant and then selecting another month begins with a consonant (*without replacement*).

_____ 13. Find the probability of choosing a month that starts with a vowel given that they end in the letter R.