

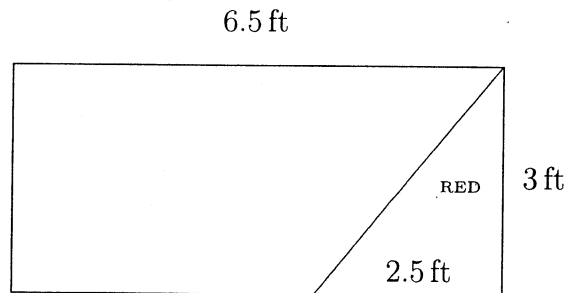
Math 206 - 2nd Final Exam

May 19, 2010

Name key
Score _____

Show all work. Supply explanations where necessary. Use only a compass and a straightedge for constructions. For each construction, the steps you follow must be apparent.

1. (5 points) A rectangular piece of plywood that measures 6.5 ft by 3 ft has a triangular region painted red on one side.



- (a) Some children laid the piece of plywood in their driveway and pitched pennies at it. They found that for every four pennies they pitched, one landed in the red triangle. If we assign a value of $1/4$ to the probability of a penny landing in the red triangle, is this probability a theoretical or an experimental probability?

THE PROBABILITY IS ASSIGNED BASED ON OBSERVATION.

IT IS AN EXPERIMENTAL PROBABILITY.

- (b) By computing areas, assign a value to the probability of a penny landing in the red triangle. Is this probability a theoretical or an experimental probability?

$$\text{Area of Rectangle} = 3 \times 6.5 \text{ ft}^2 = 19.5 \text{ ft}^2$$

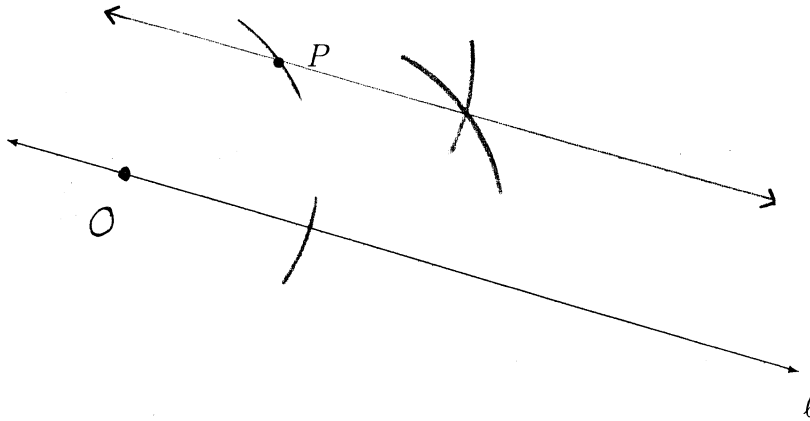
$$\text{Area of Triangle} = \frac{1}{2} (2.5 \times 3) \text{ ft}^2 = 3.75 \text{ ft}^2$$

$$\text{Probability} = \frac{3.75}{19.5} \approx 0.1923$$

or 19.23%

THIS IS A
THEORETICAL
PROBABILITY.

2. (5 points) Use only a compass and straightedge to construct a line through P parallel to l .



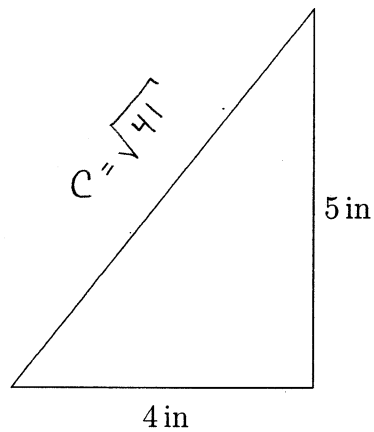
3. (5 points) Find the perimeter of the right triangle shown below. Write your final answer in centimeters, rounded to the nearest hundredth of a centimeter.

$$c^2 = 5^2 + 4^2$$

$$c^2 = 25 + 16$$

$$c^2 = 41$$

$$c = \sqrt{41}$$



$$\text{Perimeter} = (4 + 5 + \sqrt{41}) \text{ in} = 15.4031 \text{ in}$$

$$\frac{15.4031 \text{ in}}{1} \cdot \frac{2.54 \text{ cm}}{1 \text{ in}} = \boxed{39.12 \text{ cm}}$$

4. (6 points) The organizers of a charity event have planned the following game:

Contestants will pay \$5 to randomly select a bill from a box containing one \$100 bill, two \$20 bills, two \$10 bills, five \$5 bills, and ninety \$1 bills.

100 BILLS

(a) On average, how much should the event organizers expect to make for each person who plays the game?

$$E = (\$100) \left(\frac{1}{100} \right) + (\$20) \left(\frac{2}{100} \right) + (\$10) \left(\frac{2}{100} \right) + (\$5) \left(\frac{5}{100} \right) + (\$1) \left(\frac{90}{100} \right)$$
$$= \$2.75$$

$$(\text{PRICE TO PLAY}) - (\text{EXPECTED VALUE}) = \$5 - \$2.75$$
$$= \boxed{\$2.25}$$

(b) Is the game fair? Explain.

No, TO BE FAIR THE COST TO
PLAY MUST EQUAL THE EXPECTED VALUE.

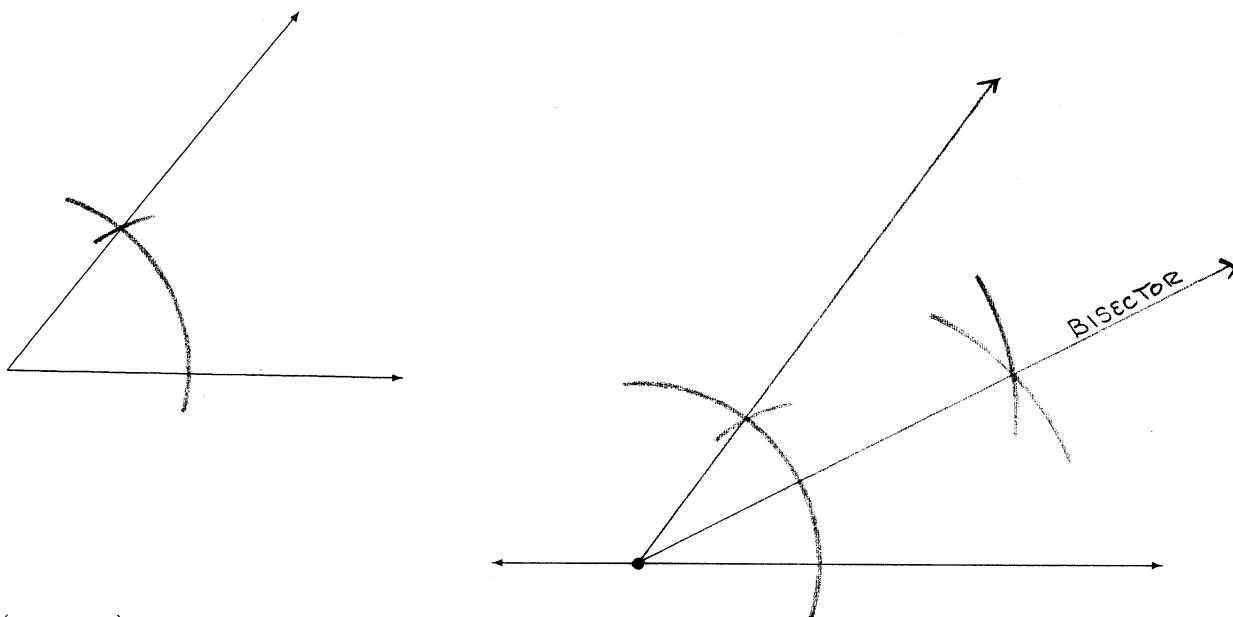
(c) What are the odds against selecting a \$5 bill?

$$\frac{\# \text{ OF UNFAVORABLE OUTCOMES}}{\# \text{ OF FAVORABLE OUTCOMES}} = \boxed{\frac{95}{5}}$$

5. (3 points) Convert 123,456 in to miles. Round your final answer to the nearest hundredth.

$$\frac{123,456 \text{ in}}{1} \cdot \frac{1 \text{ FT}}{12 \text{ in}} \cdot \frac{1 \text{ mi}}{5280 \text{ FT}} = \boxed{1.95 \text{ mi}}$$

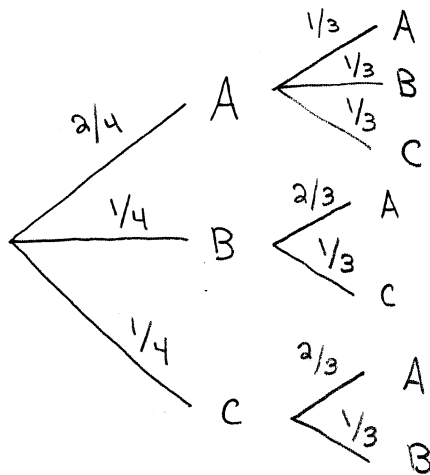
6. (6 points) Copy the given angle so that its initial side lies on the given line. Then bisect the copied angle.



7. (6 points) Two letters are selected at random, one at a time without replacement, from the following box.

A A B C

- (a) Sketch the probability tree diagram associated with this two-stage experiment.



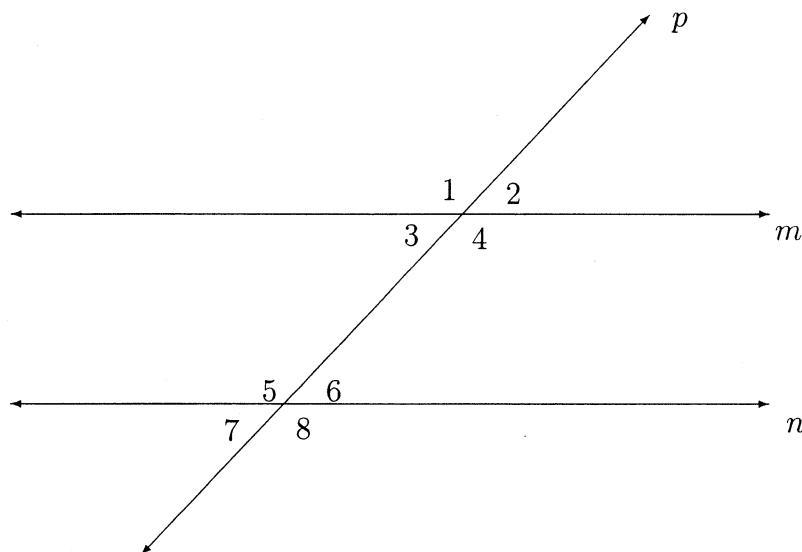
- (b) What is the probability that one of the selected letters is a C?

$$\left(\frac{2}{4}\right)\left(\frac{1}{3}\right) + \left(\frac{1}{4}\right)\left(\frac{1}{3}\right) + \frac{1}{4} = \frac{6}{12} = \frac{1}{2}$$

- (c) List the event of selecting a C on the first draw.

{ CA, CB }

8. (6 points) In the following figure, the parallel lines m and n are being cut by transversal p .



- (a) Name a pair of alternating exterior angles.

$$\angle 1 \text{ \& } \angle 8 \quad \text{or} \quad \angle 2 \text{ \& } \angle 7$$

- (b) Name a pair of corresponding angles.

$$\begin{array}{ll} \angle 1 \text{ \& } \angle 5 & \angle 3 \text{ \& } \angle 7 \\ \angle 2 \text{ \& } \angle 6 & \angle 4 \text{ \& } \angle 8 \end{array}$$

- (c) Name a pair of alternating interior angles.

$$\angle 4 \text{ \& } \angle 5 \quad \text{or} \quad \angle 3 \text{ \& } \angle 6$$

- (d) Name a pair of vertical angles.

$$\begin{array}{ll} \angle 1 \text{ \& } \angle 4 & \angle 5 \text{ \& } \angle 8 \\ \angle 2 \text{ \& } \angle 3 & \angle 6 \text{ \& } \angle 7 \end{array}$$

- (e) Name a pair of adjacent angles.

$$\angle 1 \text{ \& } \angle 2, \quad \angle 2 \text{ \& } \angle 4, \quad \angle 4 \text{ \& } \angle 3, \quad \dots$$

- (f) Name a pair of supplementary angles that are not adjacent.

$$\begin{array}{l} \angle 2 \text{ \& } \angle 8, \quad \angle 4 \text{ \& } \angle 6, \quad \angle 1 \text{ \& } \angle 7, \\ \angle 3 \text{ \& } \angle 5, \quad \dots \end{array}$$

185
TOTAL
ITEMS

9. (5 points) Last year the junior high spirit squad sold five items as homecoming souvenirs. They sold 61 pom-poms for \$1 each, 57 pins for \$1 each, 19 cups for \$2 each, 45 key rings for \$3 each, and 3 T-shirts for \$22 each.

(a) Find the mean, median, and mode(s) of the prices paid for homecoming souvenirs.

118 ITEMS WERE SOLD FOR \$1. 67 ITEMS WERE SOLD FOR NOT \$1.

CLEARLY BOTH THE MEDIAN & MODE ARE \$1.

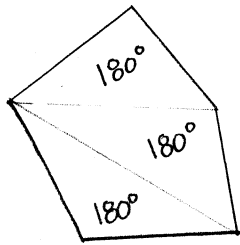
$$\text{MEAN} = \frac{(\$1)(61) + (\$1)(57) + (\$2)(19) + (\$3)(45) + (\$22)(3)}{185} = \$1.93$$

(b) Which measure of central tendency is most appropriate when describing the average price paid for a souvenir? Why?

MOST ITEMS THAT WERE SOLD COST \$1.

THE MODE IS BEST.

10. (3 points) Sketch a convex pentagon. What is the sum of the measures of the interior angles? Explain how your result can be derived by using triangles.



INTERIOR ANGLES ADD UP TO

$$3(180^\circ) = 540^\circ$$

A CONVEX PENTAGON CAN BE DISSECTED INTO 3 TRIANGLES. THE INTERIOR L'S OF EACH TRIANGLE ADD UP TO 180°.

11. (5 points) Which of the following could be used as a definition of a square? Circle all that apply.

(a) A square is a rhombus with a right angle.

(b) A square is a quadrilateral with four congruent sides. No. THIS IS A RHOMBUS

(c) A square is a rectangle that is also a kite.

(d) A square is a kite with a right angle. No.



(e) A square is a rectangle that is also a rhombus.

(f) A square is a parallelogram that is also a kite. No. THIS IS A RHOMBUS.

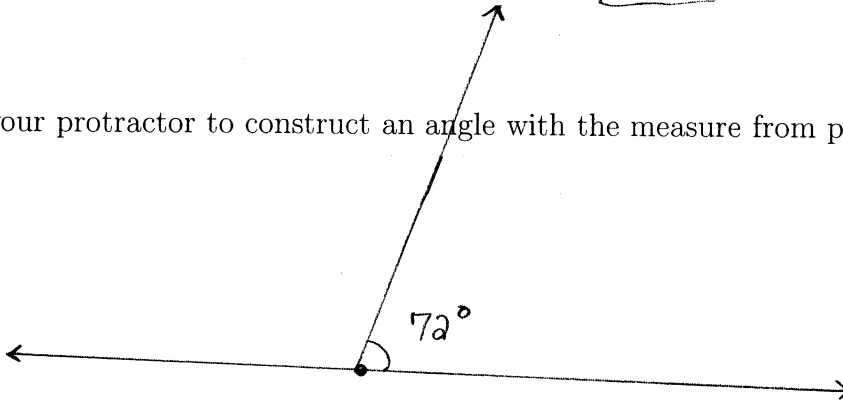
12. (4 points) Stacy makes \$4000 each month, and \$800 of that goes to paying her mortgage.

(a) If Stacy was to build a circle graph (pie chart) showing her monthly expenditures, what would be the measure of the angle of the portion of the circle graph corresponding to her mortgage?

$$\frac{800}{4000} = \frac{1}{5}$$

$$\frac{1}{5} \text{ OF } 360^\circ = \boxed{72^\circ}$$

(b) Use your protractor to construct an angle with the measure from part (a).

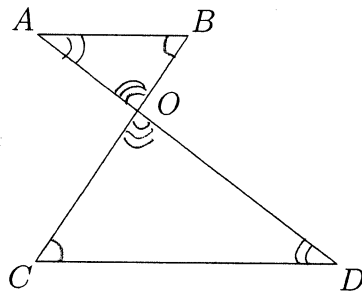


13. (5 points) Given that $AB \parallel CD$, prove that $\triangle AOB$ is similar to $\triangle DOC$. Carefully explain your reasoning.

$\angle ABC$ AND
 $\angle DCB$ ARE

CONGRUENT

ALT INTERIOR \angle 'S.



THE \angle 'S AT O
ARE CONGRUENT
VERTICAL \angle 'S.

$\angle BAD$ AND $\angle CDA$

ARE CONGRUENT ALT INTERIOR \angle 'S

$\triangle AOB \sim \triangle DOC$ BY AAA.

14. (5 points) Fill in the blank with the correct word or phrase.

(a) A simple, closed, polygonal curve is called a(n) POLYGON.

(b) A(n) ACUTE angle is an angle whose measure lies between 0° and 90° .

(c) CPCTC stands for CORRESPONDING PARTS OF CONGRUENT Δ 'S ARE CONGRUENT.

(d) A polygon for which all sides are congruent and all interior angles are congruent is called a(n) REGULAR polygon.

(e) If the sum of the measures of two angles is 90° , then the angles are said to be COMPLEMENTARY.

15. (2 points) Given the figure below and no other information, which of the following statements is not necessarily true?

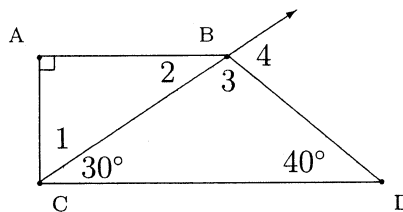
(a) $m(\angle 3) = 110^\circ$

(b) $m(\angle 1) = 60^\circ$

(c) $m(\angle 1) + m(\angle 2) = 90^\circ$

(d) $70^\circ + m(\angle 3) = 180^\circ$

(e) $\angle 1$ is an acute angle.



16. (4 points) Consider the following collection of test scores.

98 52 98 45
37 45 98 79

(a) Use your calculator to find the mean and standard deviation.

$$\bar{x} = 69, \quad s = 25.219$$

(b) Compute the z-score corresponding to 88.

$$z = \frac{88 - 69}{25.219} = 0.7534$$