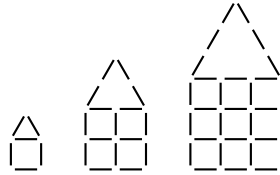# Midterm

Show all your work

Name: _____

Number: _____

Signature: _____

Score: ___/35

Problem 1: Anjali used toothpicks to form a sequence of houses.

    a. Draw the fourth house in the sequence.

    b. Count the total number of toothpicks in the fourth picture.

    c. Establish a formula $H(n)$ for the total number of toothpicks in the nth house.

Score: /3

Problem 2: Katharina's parents invited 4 couples and 6 singles to their home. Suppose the couples (5 in total) and 6 singles all shook hands with one another except the couples did not shake hands with their own partners, how many handshakes were there?

Score: /2

Problem 3: Mei has a mason bee house in her garden while Mei's brother collects spiders. If the number of bees is three less than twice the number of spiders, and the total number of bees and spiders is 12, find the total number of legs assuming that all bees and spiders have all the legs each is supposed to have: six each for bees and eight each for spiders. The following table may help you organize your work for the number of legs.

Score: /2

Problem 4: Mei flips a nickel, a dime, a quarter, a loonie, and a toonie (a two-dollar Canadian coin). How many different results can she expect from flipping these five different coins? Use a tree diagram to support your answer.

Score: /2

Problem 5: Fire Horse is looking at the following from different numeration systems. Sort them from smallest to largest.

 Each correct conversion to a Hindu-Arabic numeral earns one point.
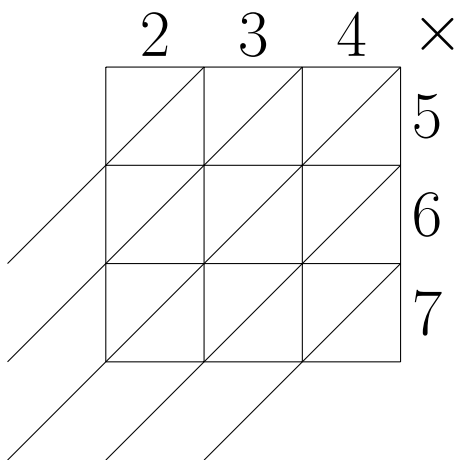
a.

b.

c. MCMLXXIV

d. 1010011_2

e. $8CB_{16}$

f.

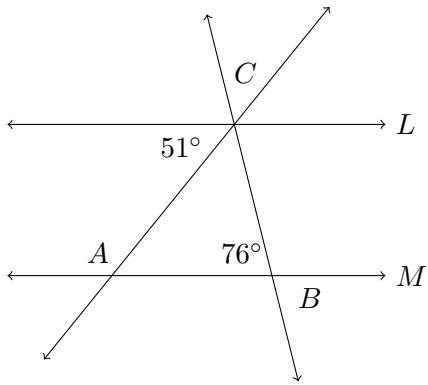**Problem 6**: Multiply 234×567 using the galley method.

$$2 \quad 3 \quad 4 \quad \times$$

$$5$$

$$6$$

$$7$$

Problem 7: Fire Horse has a bag of chickpeas. When she plants them 5 in a row or 7 in a row, she has 3 left over in each case. If she plants them 9 in a row, she has 1 left over. Find

the smallest number of chickpeas that Fire Horse may have.

**Problem 8**: Lines L and M are parallel. Find the measures of $\angle A = $ [ ],

$\angle B = $ [ ], and $\angle C = $ [ ].

Problem 9: Set up a table for convex polygons' angle sums beginning with a triangle, followed by a quadrilateral, a pentagon, and so on. State the angle sum of an eleven-sided polygon.
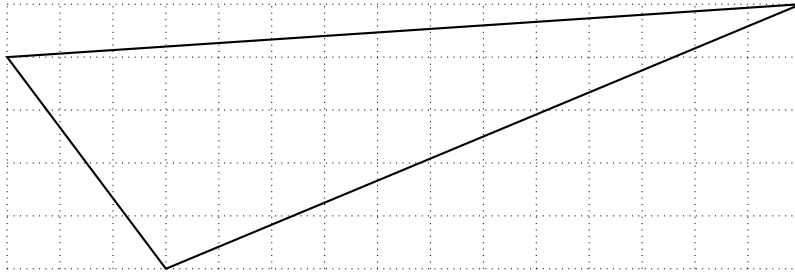
Polygon: △ ◇ ⬠   ◯

Angle sum:

Problem 10: Shown is a 1.5 m tall pedestrian standing near a lamp post of 3 m high. If the pedestrian's shadow is 2 m long, how far away is the pedestrian standing away from the base of the lamp post?
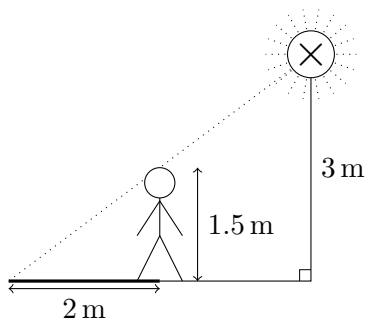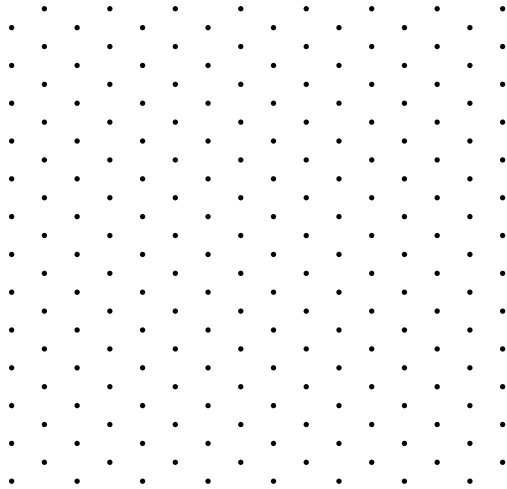
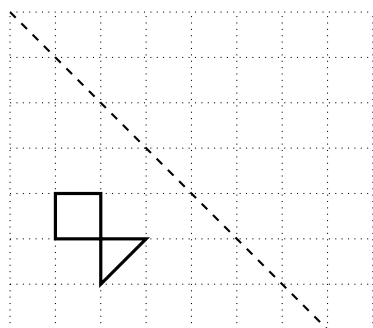**Problem 11**: Below is a 5 × 15 grid containing a big triangle. Find the area of the big triangle. Show your work.

Problem 12: In the three dimensional guide below, draw a three-step staircase where each step is 2 units long by 1 unit wide, and each step rises 1 unit tall. Find the volume and surface area of the staircase.

Problem 13: Reflect the given figure along the given diagonal.