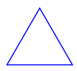
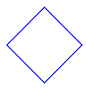
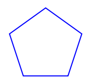
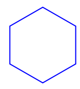
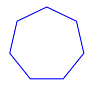
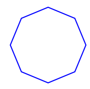
Math 123
Fall 2023
Dr. Lily Yen

Assignment 3

Show all your work

Name: ____________________
Number: ____________________
Signature: ____________________
Score: ___/18

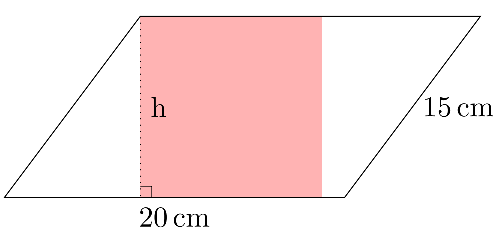
Problem 1: Set up a table for convex polygons' angle sums beginning with a triangle, followed by a quadrilateral, a pentagon, and so on. From your table, derive a formula for the measure of an interior angle in a regular n-sided polygon.

Polygon:								n-gon
Angle sum:	180	360	540	720	900	1080	...	$180(n-2)$

So an interior angle has $180(n-2)/n$ degrees.

Score: /3

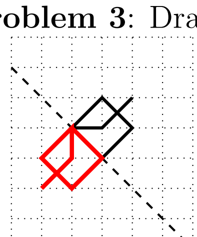
Problem 2: Given that the area of the parallelogram shown is $240\,\text{cm}^2$ with a slant side of 15 cm, find the height, h, of the parallelogram. Include units.



The area of a parallelogram is $A = bh = 20\,\text{cm} \times h = 240\,\text{cm}^2$. So $h = 12\,\text{cm}$.

Score: /2

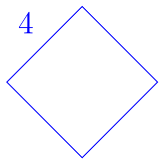
Problem 3: Draw a reflection of the given figure along the given line.

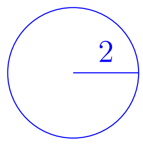


Score: /2

/7

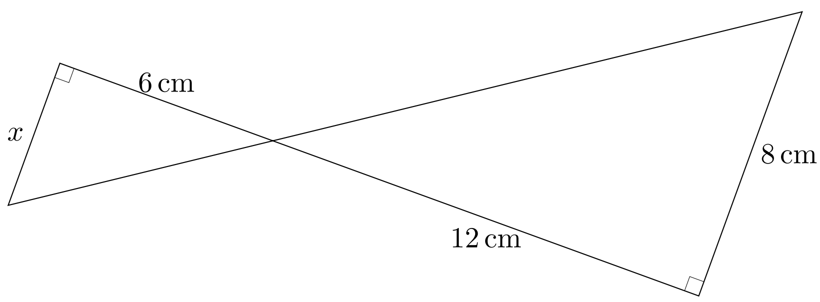
Problem 4: Which of the two shapes cover more area? A square of side length 4 or a circle of diameter 4. Show your work to support your claim.

The square  has area 16 square units.

The circle  has area $4\pi \approx 12.6$, so it covers less area than the square.

Score: /3

Problem 5: Find $x = \boxed{4\,\text{cm}}$. Name the triangles and provide reasons for your claim.



The two inner angles are vertically opposite so equal. Since each triangle has a right angle, the third angles have to be equal, too. Hence the triangles are similar and $\frac{x}{6} = \frac{8}{12}$, so $x = 6 \times \frac{8}{12} = 4$.

Score: /3

Problem 6: Take two rectangular prisms with the same volume of $12\,\text{cm}^3$. Suppose that the dimensions of both prisms are integer centimetre lengths.

a. Draw two examples of such rectangular prisms with different surface areas. Clear label the dimensions of each.

All the possible boxes are

Dimensions	$1 \times 1 \times 12$	$1 \times 2 \times 6$	$1 \times 3 \times 4$	$2 \times 2 \times 3$
Surface Area	50	40	38	32

Each dimension is in centimetre, and the surface areas are in square centimetres.

Score: /2

b. Find two such rectangular prisms whose surface areas differ as much as possible.

With a complete listing of volume $12\,\text{cm}^3$ rectangular prisms with integral dimensions, we choose the first one with $50\,\text{cm}^2$ and the last one with $32\,\text{cm}^2$ to achieve the greatest difference in surface area of $18\,\text{cm}^2$.

Score: /3

/11