Unit A: Geometry

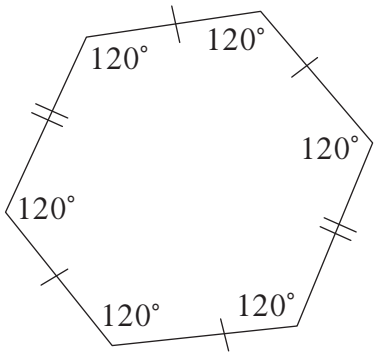
For full marks, show all calculations, steps, and/or explain your answers. State all necessary formulas.

Total: 45 marks.

(3) 1. Match each polygon with its definition. Write the number that best matches the definition.

Definition	Polygon
____ a. a closed, straight-sided shape with three or more line segments	1. regular polygon
____ b. a closed-sided shape without vertices pointing inward	2. quadrilateral
____ c. a closed, straight-sided shape with at least one vertex pointing inward	3. convex polygon
____ d. a polygon with all sides equal and angles equal	4. irregular polygon
____ e. a polygon with unequal sides, angles, or both	5. polygon
____ f. a four-sided polygon	6. concave polygon

(1) 2. Explain why this polygon is not a regular polygon.



3. Remi is building a garden in the shape of an octagon.

(1) a. Find the sum of the interior angles of the octagon.

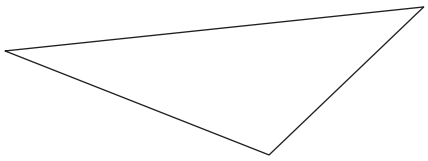
(1) b. Find the measure of one of the interior angles in the octagon.

4. Classify each triangle below according to both angle and side length. Each triangle must have two classifications.

Angle Classification	**Side Length Classification**
A. right triangle	D. equilateral triangle
B. acute triangle	E. isosceles triangle
C. obtuse triangle	F. scalene triangle

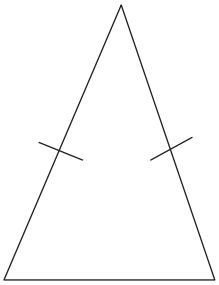
(1) a. _____

_____



(1) b. _____

_____



(5) 5. Match the shape to its definition.

Definition

____ a. a quadrilateral with two pairs of equal adjacent sides

____ b. a triangle where two sides are equal in length

____ c. a quadrilateral with two sides equal in length at most and one pair of opposite sides that are parallel

____ d. a four-sided polygon

____ e. a triangle where all three sides are equal in length

____ f. a quadrilateral with four equal sides

____ g. a quadrilateral with all four sides equal and all interior angles are 90°

____ h. a triangle where no sides are equal in length

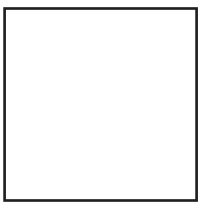
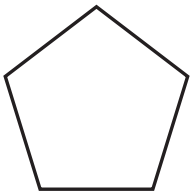
____ i. a quadrilateral with opposite sides parallel and equal in length as well as interior angles equal to 90°

____ j. a quadrilateral with two pairs of equal and parallel opposite sides

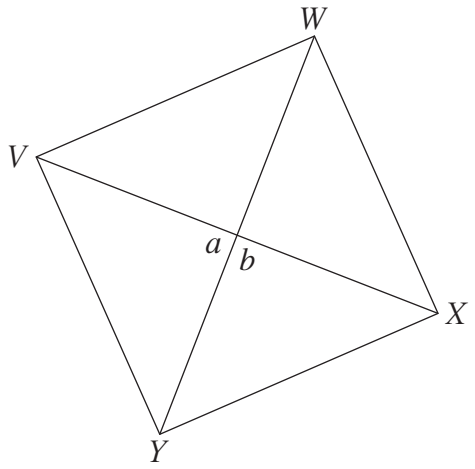
Shape

1. equilateral triangle
2. isosceles triangle
3. kite
4. parallelogram
5. quadrilateral
6. rectangle
7. rhombus
8. scalene triangle
9. square
10. trapezoid

(2) 6. Draw all the diagonals in each of the following regular polygons. How many diagonals does each polygon have?

four sides	five sides
	
_____ diagonals	_____ diagonals

(2) 7. Determine the missing measurements for the quadrilateral below.



In square $VWXY$,
$VY = 6.7$ cm

$VX = 9.5$ cm

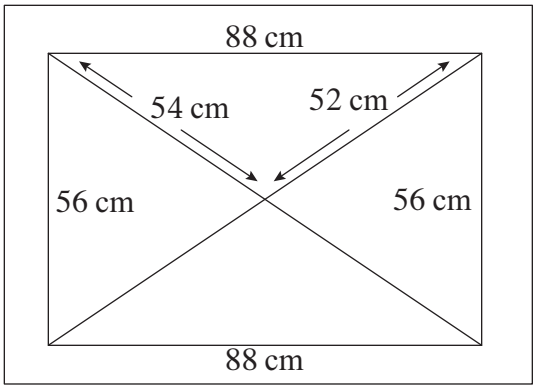
$\angle a =$ _____

$\angle b =$ _____

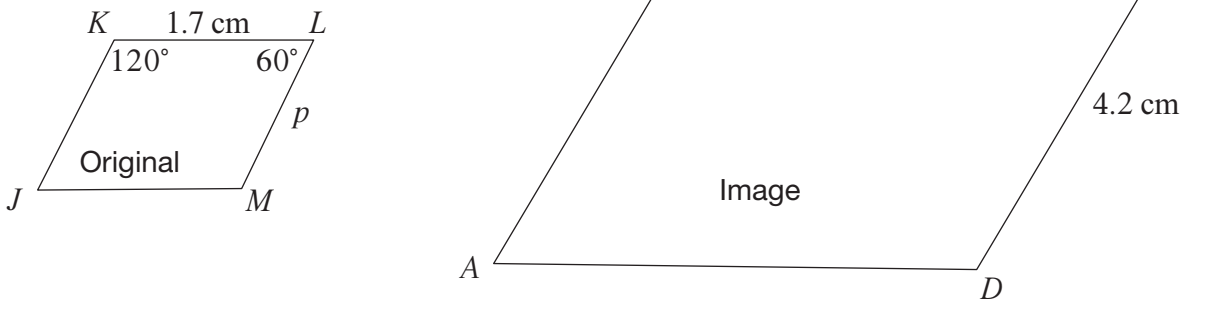
$VW =$ _____

$WY =$ _____

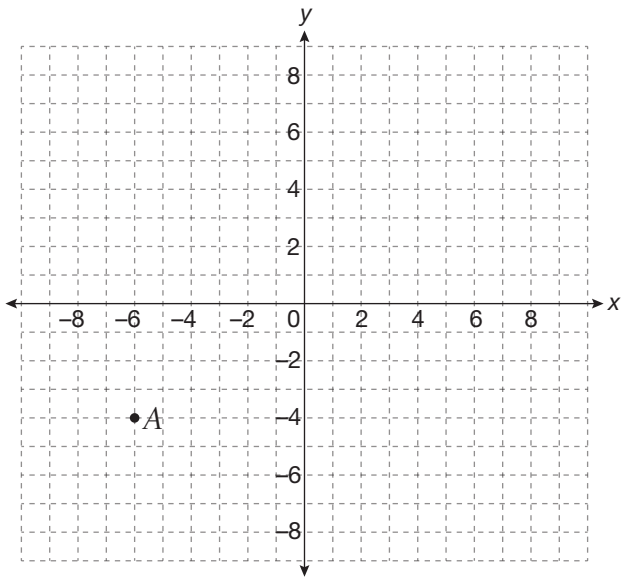
(1) 8. Ryan has built a window frame. He wants to check that the frame he built will fit a rectangular pane of glass. According to his measurements below, is Ryan's window frame a rectangle? Explain.



(2) 9. Parallelogram $ABCD$ and parallelogram $JKLM$ are similar. Find the value of p.

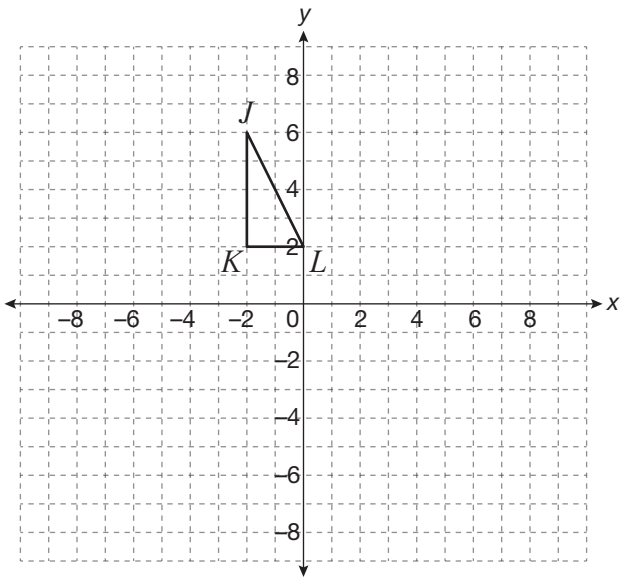


(1) 10. Translate point $A(-6, -4)$ horizontally 5 units to the right and vertically 7 units up. Label the transformed point A'. State the coordinates of A'.

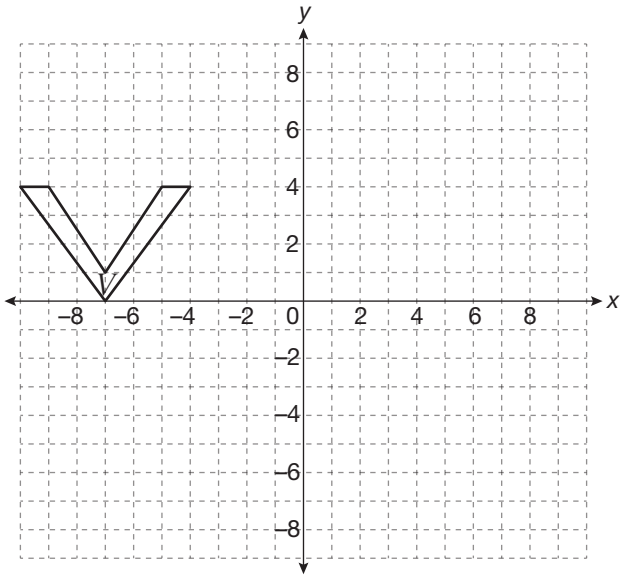


The coordinates of A' are _____.

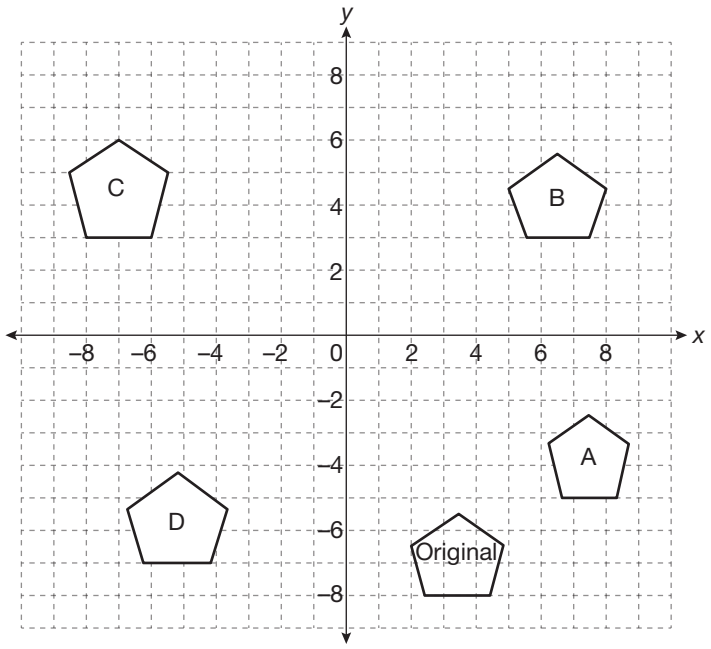
(1) 11. Translate $\triangle JKL$ horizontally 2 units to the left and vertically 4 units down. Label each new vertex using the correct notation.



(1) 12. Translate the V horizontally 13 units to the right and vertically 8 units down. Label the resulting image V'.

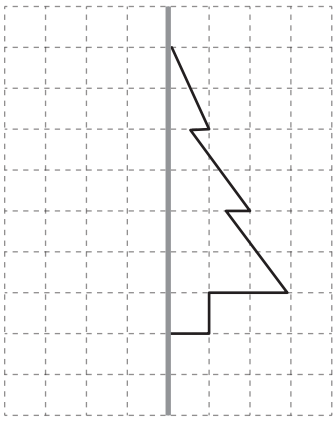


(1) 13. Which image is a translation of the original pentagon?

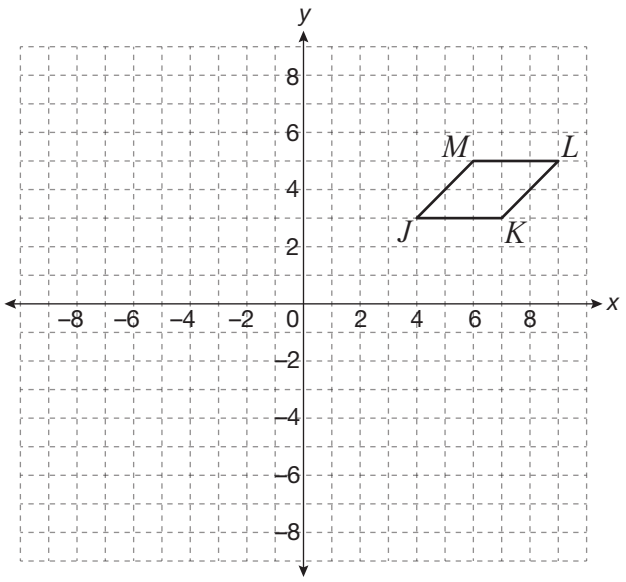


_____

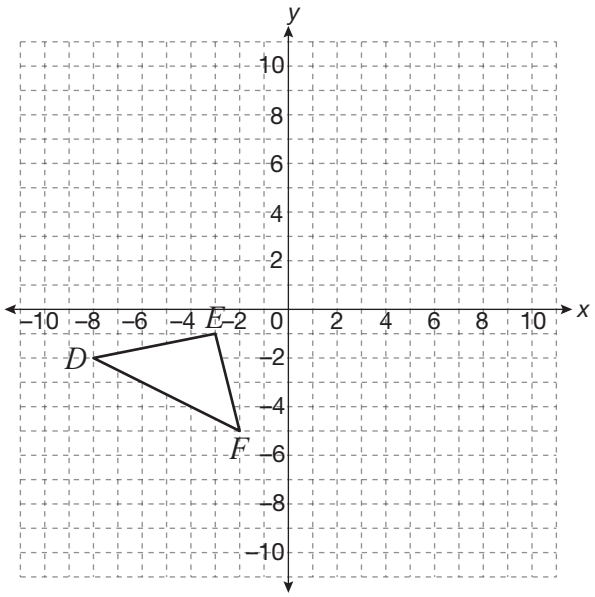
(1) 14. Complete the pattern in the diagram below by drawing the reflection of the shape using a vertical line of reflection.



(2) 15. Reflect quadrilateral $JKLM$ in the x-axis and then in the y-axis. Draw and label the two resulting images, quadrilaterals $J'K'L'M'$ and $J''K''L''M''$.

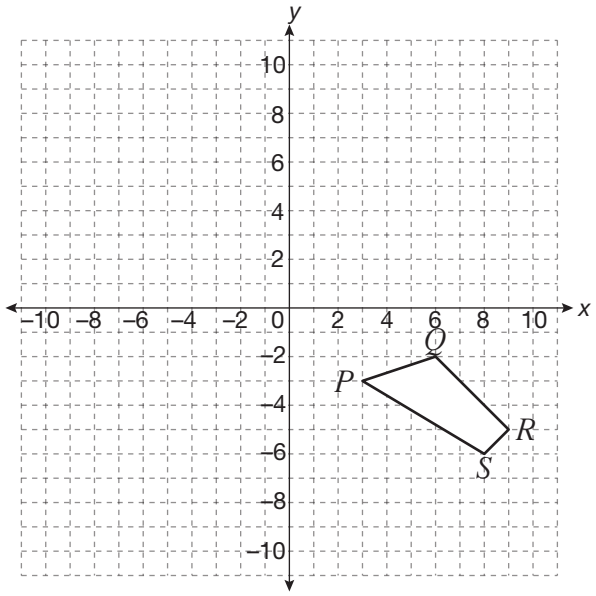


(2) 16. Rotate $\triangle DEF$ $180°$ clockwise about the origin. State the coordinates of the image, $\triangle D'E'F'$.



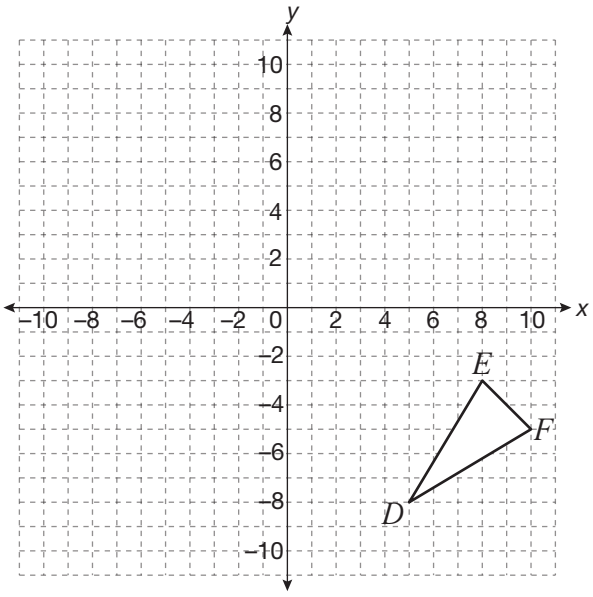
Coordinates: _____

(1) 17. Rotate quadrilateral $PQRS$ $270°$ counterclockwise about the origin. Draw and label the image, quadrilateral $P'Q'R'S'$.

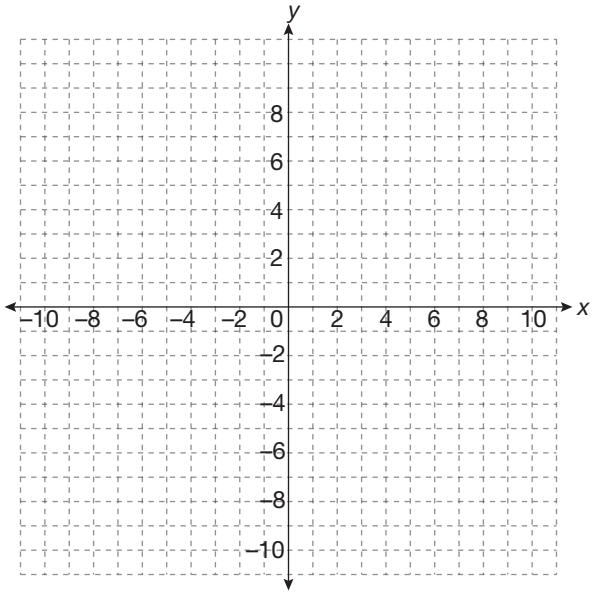


18. Follow the steps below to transform $\triangle DEF$.

(1) a. Reflect $\triangle DEF$ in the y-axis to produce the reflected image, $\triangle D'E'F'$.
- Draw and label reflected image $D'E'F'$.

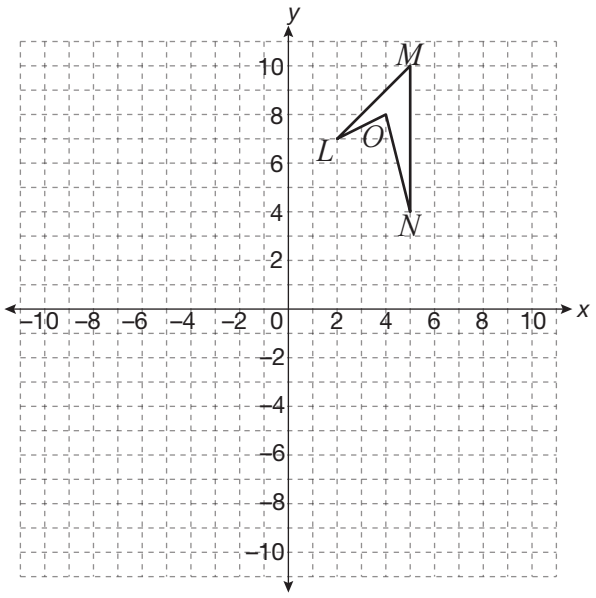


(1) b. Translate $\triangle D'E'F'$ horizontally 7 units to the right and 9 units up to produce the translated image, $\triangle D''E''F''$.
- Draw and label translated image $D''E''F''$.

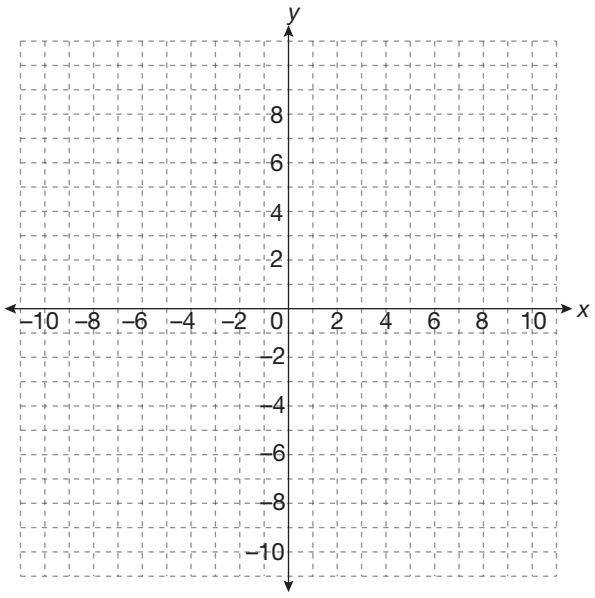


19. Rotate quadrilateral $LMNO$ $90°$ counterclockwise about the origin.

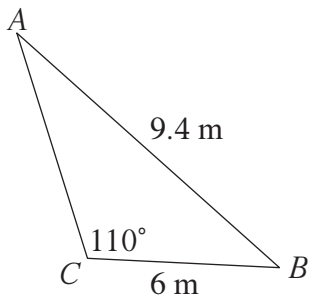
(1) a. Draw and label the resulting image, quadrilateral $L'M'N'O'$.



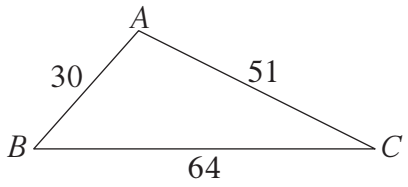
(1) b. Reflect the image $L'M'N'O'$ in the x-axis. Label the resulting image $L''M''N''O''$.



(2) 20. Use the sine law to find the measure of $\angle A$ to the nearest degree.

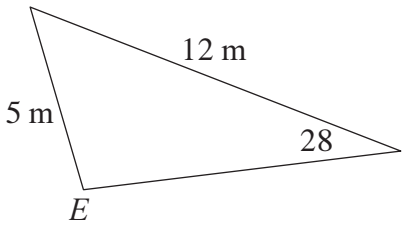


(2) 21. Use the cosine law to determine the measure of $\angle B$ to the nearest degree.

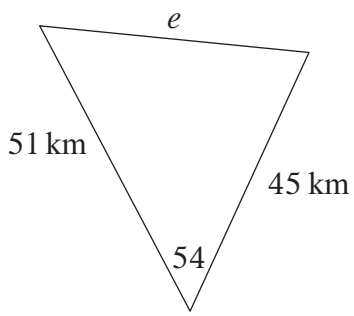


(2) 22. State whether the sine law or the cosine law is the best choice to solve for $\angle E$ and side e, respectively. Explain. Do not solve.

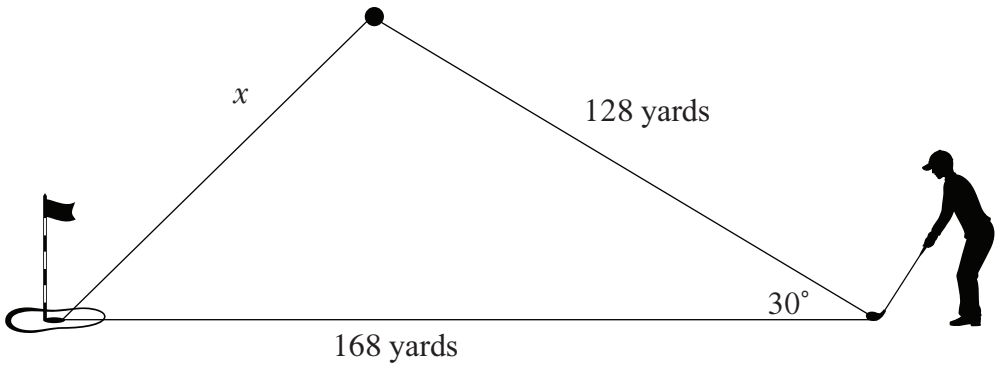
a.



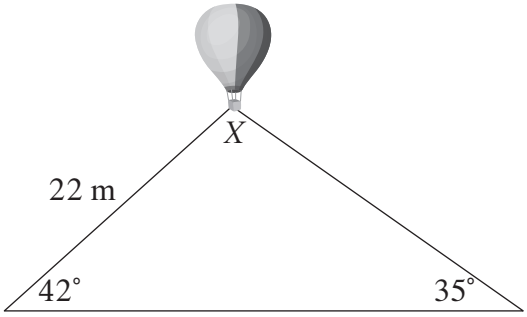
b.



(2) 23. Rajvir is golfing. The distance from the tee to the green on the seventh hole is 168 yards. His first shot was 128 yards but was 30° off a direct line to the hole. How far does Rajvir have to hit his next shot? Round the answer to 1 decimal place.



24. A hot air balloon is tethered to the ground by two ropes. The first rope makes an angle of 42° with the ground and is 22 metres long. The second rope makes an angle of 35° with the ground.



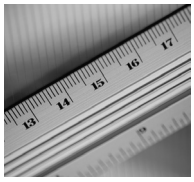
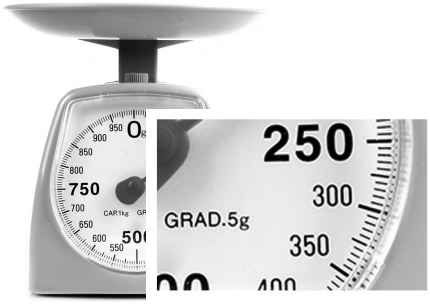
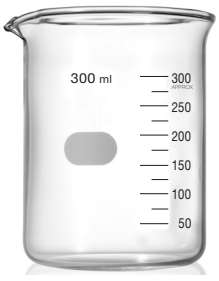
(1) a. What is the angle between the two ropes, $\angle X$?

(2) b. How far apart, in metres m, are the tethers on the ground? Round the answer to 1 decimal place.

Unit B: Measurement

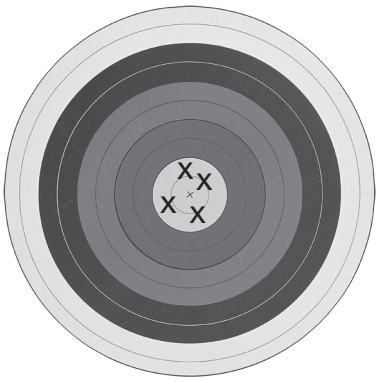
Total: 15 marks.

(6) 25. Complete the following table. The first row as been completed as an example.

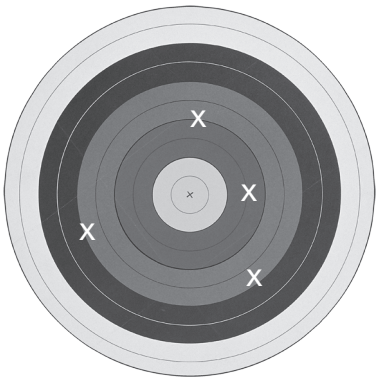
Tool	Smallest Increment on the Tool (include units)	Strength(s) of the Tool	Limitation(s) of the Tool
Name: desk ruler 	1 mm	compact and easy to use	not good for measuring very small or very large items
Name: _____ 			
Name: _____ 			
Name: _____ 			

(1) _____ 26. a. Which of the following diagrams of a target represents a measuring tool that is precise but not accurate?

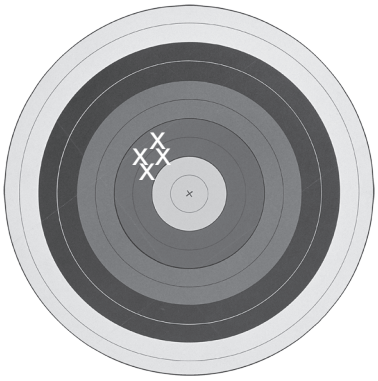
A.



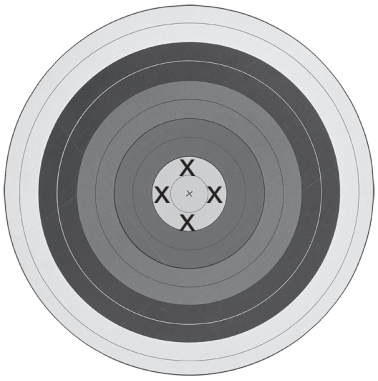
B.



C.



D.



(1) b. Explain why you chose the answer you did.

(1) 27. Usman needs to measure the width of the head of a nail. He is unsure if he should use a micrometer or a ruler. What measuring tool would you suggest Usman use? Explain.

(3) 28. For each of the following diagrams, state the precision and uncertainty shown. Express the readings as measurement $\pm$ uncertainty.

a.

precision = _____

uncertainty = _____

speed = _____

b.

precision = _____

uncertainty = _____

weight = _____

(1) 29. The wall of a hydraulic cylinder is $7.62\ \text{mm} \pm 0.005\ \text{mm}$. What are the maximum and minimum measurements of the wall?

30. A seed producer is packaging kale seeds. The nominal value for the mass of a package of kale seeds is $0.50\ \text{grams}$ with a tolerance of $0.02\ \text{grams}$. An employee checks the mass of six packages, and the mass(es) found are recorded in the table below.

Package Number	Mass (g)
1	0.50
2	0.48
3	0.46
4	0.52
5	0.53
6	0.49

(1) a. Determine the maximum and minimum acceptable masses for the package of kale seeds?

(1) b. Which package of seeds fall within the acceptable range?