Area, perimeter, volume

1. Prior knowledge
   (a) Area: rectangle, square, triangle, parallelogram; area and perimeter (formula sheet)
   (b) Solve for parameter versus calculate result
2. Distance on the coordinate plane
   (a) Plotting, labeling points, etc.
   (b) Horizontal & vertical distances
   (c) Pythagorean formula
   (d) Applications: Rhombus, isosceles $\triangle$,
   (e) Radicals, π and rounding
3. Volume: prism, cylinder, cone
   (a) Compound shapes (including margins)
   (b) Surface area
4. Circle area and circumference
   (a) Sector areas, arc length
   (b) Radian / degree conversion
5. Scaling shapes (eg. rectangle, triangles including midline)

Basic shapes

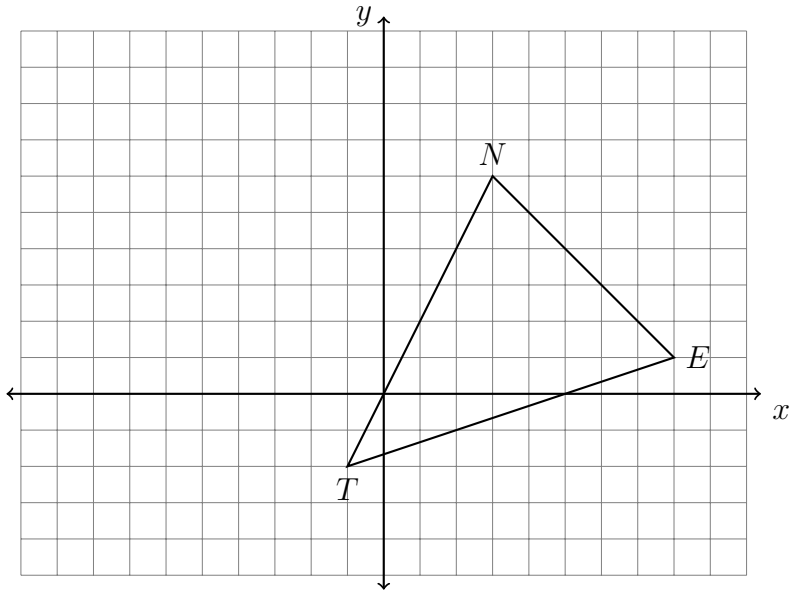
1. Regents problems, January 2017, #26, 34, 29?

Distance on the coordinate plane

2. Given $P(-2, 9)$ and $Q(3, -3)$, find the length of $\overline{PQ}$.

Distance on the coordinate plane: proofs

3. Triangle ABC has vertices with coordinates A(,), B(,), and C(,). Prove that $\triangle ABC$ is an isoscelese triangle but not an equilateral triangle. (The use of the set of axes below is optional.)
   Note: state both conclusions for full credit.
4. Triangle $\triangle TEN$ is graphed on the set of axes below. The vertices of $\triangle TEN$ have the coordinates $T(-1, -2)$, $E(8, 1)$, and $N(3, 6)$.



(a) Draw an altitude through point N perpendicular to $\overline{TE}$.

(b) What is the length of the altitude drawn through N?

(c) What is the length of the base, TE?

(d) Find the area of $\triangle TEN$.

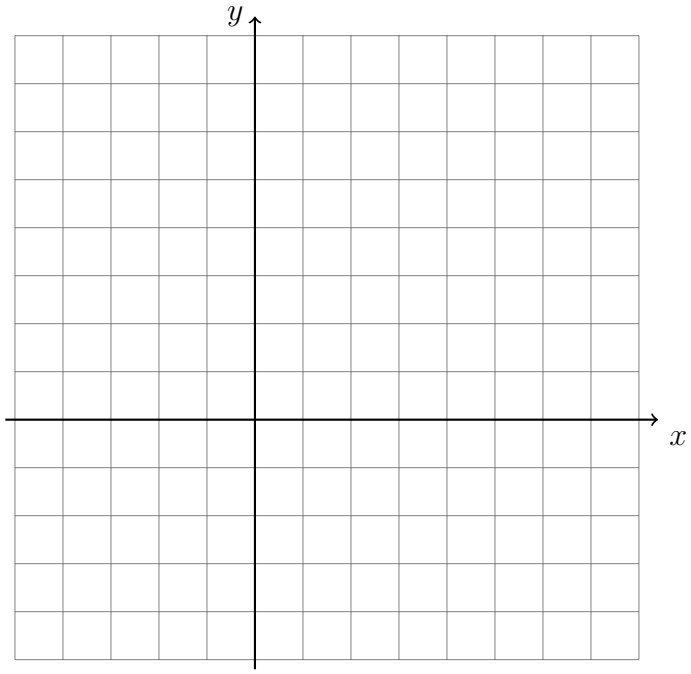
5. Given the quadrilateral $RSTU$ with $R(1, 3)$, $S(4, 7)$, $T(4, 2)$, and $U(1, -2)$.

(a) Plot and label $RSTU$ on the grid.

(b) Using the distance formula or otherwise, calculate RS, ST, TU, and RU.

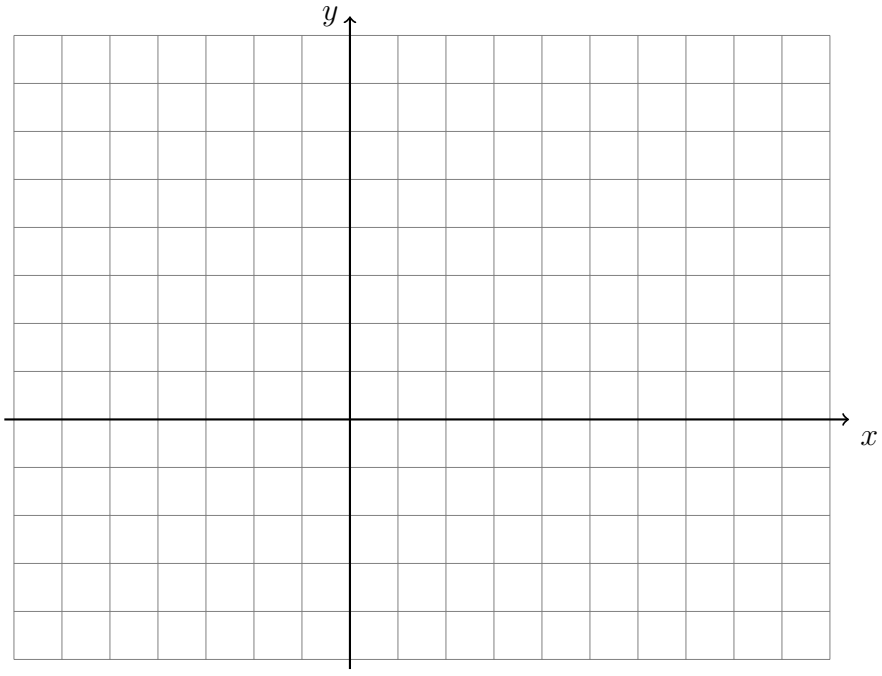
(c) Definition: If a quadrilateral has four congruent sides, then it is a rhombus.

Prove that $RSTU$ is a rhombus.



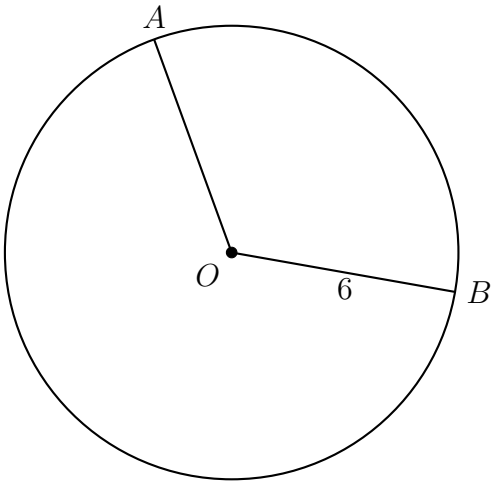
6. Given the quadrilateral $RECT$ with $R(-4, 1)$, $E(8, 1)$, $C(8, 6)$, and $T(-4, 6)$.
   (a) Plot and label $RECT$ on the grid.
   (b) Using the distance formula, calculate the length of the two diagonals RC and ET.
   (c) Theorem: If the diagonals of a quadrilateral are congruent, then it is a rectangle.

   Prove that $RECT$ is a rectangle.



Circle area and circumference

7. The diagram below shows the circle O with radii $\overline{OA}$ and $\overline{OB}$. The measure of angle AOB is $120°$, and the length of a radius is 6 inches.



Which expression represents the length of arc AB, in inches?

(a) $\frac{120}{360}(6\pi)$

(b) $120(6)$

(c) $\frac{1}{3}(36\pi)$

(d) $\frac{1}{3}(12\pi)$

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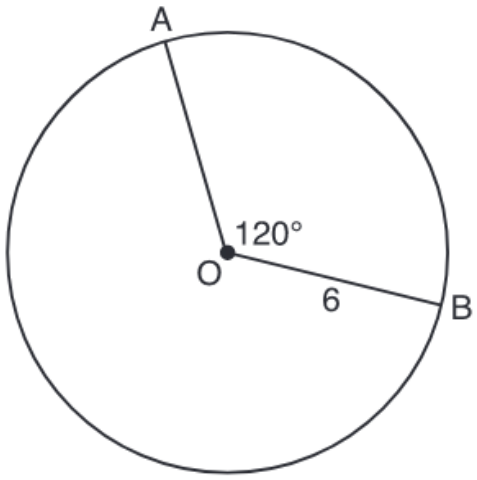

Which expression represents the length of arc AB, in inches?

(1) $\frac{120}{360}(6\pi)$

(2) $120(6)$

(3) $\frac{1}{3}(36\pi)$

(4) $\frac{1}{3}(12\pi)$