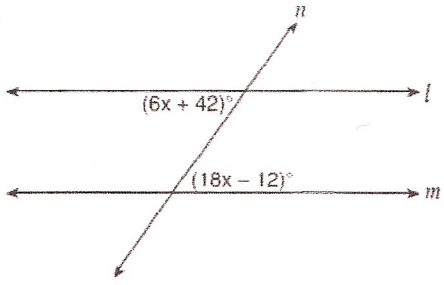
January 2012 Regents Exam

These are the questions from the January exam that contain the material we have covered so far.

1 Line n intersects lines l and m, forming the angles shown in the diagram below.



Which value of x would prove $l \parallel m$?

$6x + 42 = 18x - 12$

$54 = 12x$

$4.5 = x$

2 In a given triangle, the point of intersection of the three medians is the same as the point of intersection of the three altitudes. Which classification of the triangle is correct?

(1) scalene triangle
(2) isosceles triangle
(3) equilateral triangle
(4) right isosceles triangle

5 A line segment has endpoints (4,7) and (1,11). What is the length of the segment?

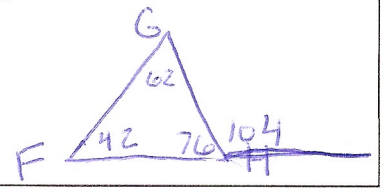
$d = \sqrt{(1-4)^2 + (11-7)^2}$

$d = \sqrt{(-3)^2 + (4)^2}$

$d = \sqrt{25} = 5$

6 In $\triangle FGH$, $m\angle F = 42$ and an exterior angle at vertex H has a measure of 104. What is $m\angle G$?

(1) 34
(2) 62
(3) 76
(4) 146



10 The angles of triangle ABC are in the ratio of 8:3:4. What is the measure of the *smallest* angle?

(1) 12°
(2) 24°
(3) 36°
(4) 72°

$180 \cdot \frac{3}{15} = 36$

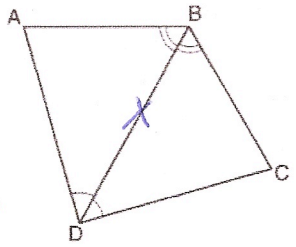
11 When a quadrilateral is reflected over the line $y = x$, which geometric relationship is *not* preserved?

(1) congruence
(2) orientation
(3) parallelism
(4) perpendicularity

13 Which statement is the negation of "Two is a prime number" and what is the truth value of the negation?

(1) Two is not a prime number; false
(2) Two is not a prime number; true
(3) A prime number is two; false
(4) A prime number is two; true

16 The diagram below shows a pair of congruent triangles, with $\angle ADB \cong \angle CDB$ and $\angle ABD \cong \angle CBD$.



Which statement must be true?

(1) $\angle ADB \cong \angle CBD$
(2) $\angle ABC \cong \angle ADC$
(3) $\overline{AB} \cong \overline{CD}$
(4) $\overline{AD} \cong \overline{CD}$

17 What is an equation of the line that is perpendicular to the line whose equation is $y = \frac{3}{5}x - 2$ and that passes through the point $(3,-6)$?

$m_{\perp} = -\frac{5}{3}$ $\quad y + 6 = -\frac{5}{3}(x-3)$

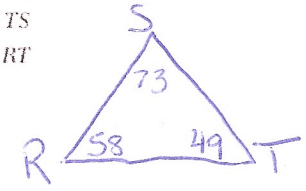
$y = -\frac{5}{3}x - 1$

18 Point A lies in plane B. How many lines can be drawn perpendicular to plane B through point A?

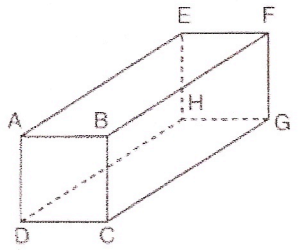
(1) one
(2) two
(3) zero
(4) infinite

22 In $\triangle RST$, $m\angle R = 58$ and $m\angle S = 73$. Which inequality is true?

(1) $RT < TS < RS$
(2) $RS < RT < TS$
(3) $RT < RS < TS$
(4) $RS < TS < RT$



21 The diagram below represents a rectangular solid.



Which statement must be true?

(1) $\overline{EH}$ and $\overline{BC}$ are coplanar.

(2) $\overline{FG}$ and $\overline{AB}$ are coplanar.

(3) $\overline{EH}$ and $\overline{AD}$ are skew.

(4) $\overline{FG}$ and $\overline{CG}$ are skew.

24 What is the equation of a line passing through $(2,-1)$ and parallel to the line represented by the equation $y = 2x + 1$?

$m_{\parallel} = 2$

$y+1 = 2(x-2)$

$y+1 = 2x-4$

$y = 2x-5$

(1) $y = -\frac{1}{2}x$

(2) $y = -\frac{1}{2}x + 1$

(3) $y = 2x - 5$

(4) $y = 2x - 1$

25 The coordinates of the endpoints of $\overline{AB}$ are $A(0,0)$ and $B(0,6)$. The equation of the perpendicular bisector of $\overline{AB}$ is

(1) $x = 0$

(2) $x = 3$

(3) $y = 0$

(4) $y = 3$

28 In $\triangle ABC$, $AB = 5$ feet and $BC = 3$ feet. Which inequality represents all possible values for the length of $\overline{AC}$, in feet?

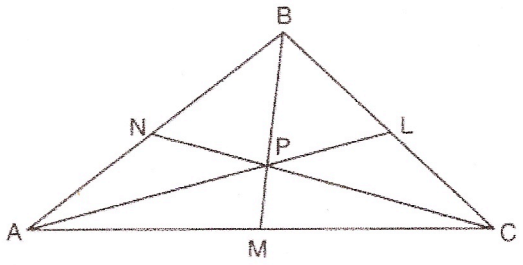
(1) $2 \leq AC \leq 8$

(2) $2 < AC < 8$

(3) $3 \leq AC \leq 7$

(4) $3 < AC < 7$

26 In the diagram below, point P is the centroid of $\triangle ABC$.



If $PM = 2x + 5$ and $BP = 7x + 4$, what is the length of $\overline{PM}$?

$2(2x+5) = 7x+4$

$4x+10 = 7x+4$

$6 = 3x$

$x=2$

$\overline{PM} = 9$

31 Determine whether the two lines represented by the equations $y = 2x + 3$ and $2y + x = 6$ are parallel, perpendicular, or neither.

$2y + x = 6$

$y = -\frac{1}{2}x + 3$

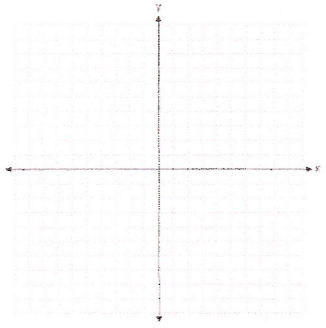
Justify your response.

The 2 lines are ⊥ because the lines have slopes that are negative reciprocals

32 The coordinates of the vertices of $\triangle RST$ are $R(-2,3)$, $S(4,4)$, and $T(2,-2)$. Triangle $R'S'T'$ is the image of $\triangle RST$ after a rotation of 90° about the origin.

State the coordinates of the vertices of $\triangle R'S'T'$.

[The use of the set of axes below is optional.]



$R'(-3,-2)$

$S'(-4,4)$

$T'(2,2)$

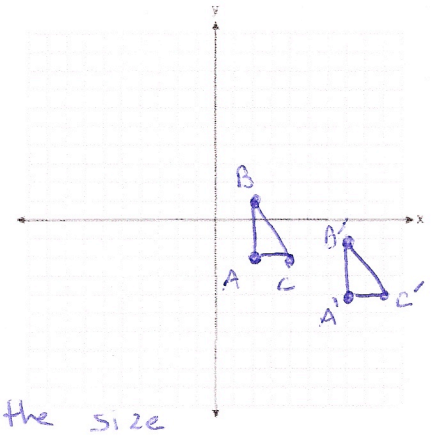
35 Triangle ABC has coordinates $A(2,-2)$, $B(2,1)$, and $C(4,-2)$. Triangle $A'B'C'$ is the image of $\triangle ABC$ under $T_{5,-3}$.

On the set of axes below, graph and label $\triangle ABC$ and its image, $\triangle A'B'C'$.

Determine the relationship between the area of $\triangle ABC$ and the area of $\triangle A'B'C'$.

Justify your response.

A' (7, -4)
B' (7, -1)
C' (9, -4)



The areas are the same

Translation preserves the size of the △

37 Triangle HKL has vertices $H(-7,2)$, $K(3,-4)$, and $L(5,4)$. The midpoint of $\overline{HL}$ is M and the midpoint of $\overline{LK}$ is N.

Determine and state the coordinates of points M and N.

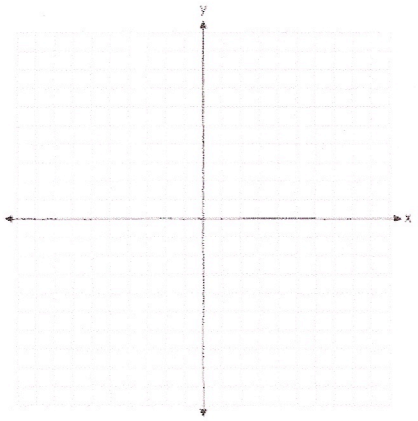
Justify the statement: $\overline{MN}$ is parallel to $\overline{HK}$.

[The use of the set of axes below is optional.]

M: (-1, 3)
N: (4, 0)

$m_{MN} = \frac{3-0}{-1-4} = \frac{3}{-5}$

$m_{HK} = \frac{-4-2}{3+7} = \frac{-6}{10} = -\frac{3}{5}$

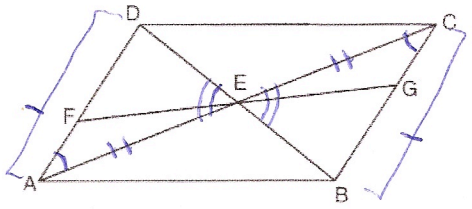


Slopes are the same so the lines are parallel

38 In the diagram below of quadrilateral $ABCD$, $\overline{AD} \cong \overline{BC}$ and $\angle DAE \cong \angle BCE$.

Line segments AC, DB, and FG intersect at E.

Prove: $\triangle AEF \cong \triangle CEG$



Statements	Reasons
(1) $\overline{AD} \cong \overline{BC}$ $\angle DAE \cong \angle BCE$	(1) Given
(2) $\angle DEA \cong \angle BEC$	(2) Vertical $\angle$'s are $\cong$
(3) $\triangle DEA \cong \triangle BEC$	(3) AAS
(4) $\overline{AE} \cong \overline{CE}$	(4) CPCTC
(5) $\angle AEF \cong \angle CEG$	(5) Vertical $\angle$'s are $\cong$
(6) $\triangle AEF \cong \triangle CEG$	(6) ASA