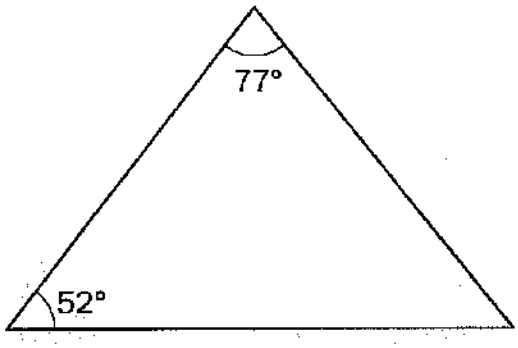
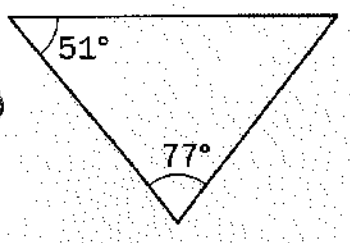
Item 1

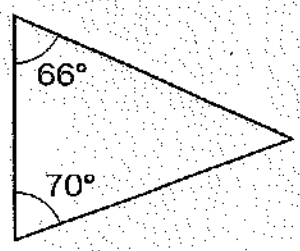
Look at the triangle.

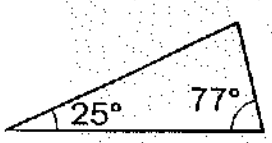


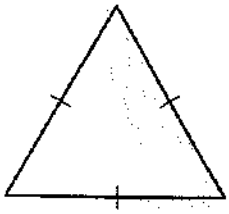
Which triangle is similar to the given triangle?

A. 

*When the 3rd angle is found, corresponding angles are congruent.

B. 

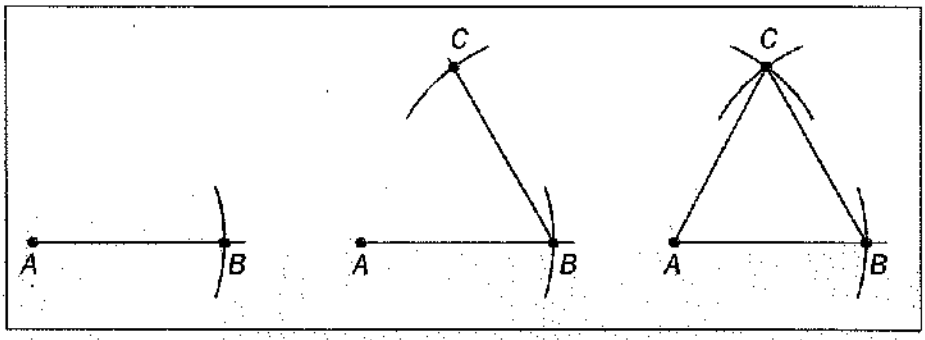
C. 

D. 

* B, C, D are incorrect because they have angle measures that are different than the original triangle

Item 2

The following are the steps to construct an equilateral triangle. Determine the error in the steps. Write your answer on the lines provided.

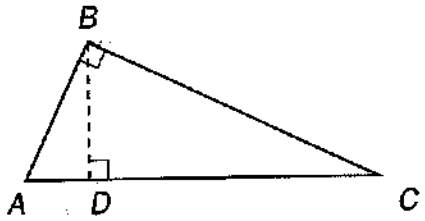


2 points

In step 2, line segment BC cannot be drawn until after both arcs are drawn from endpoint A and B. Point C, is the intersection of the arcs drawn from endpoints A and B. The segment BC and AC are drawn after that intersection is found.

Item 3

Right ΔABC with altitude BD.



Prove ΔABC is similar to ΔBDC.

4 points

	Statement	Justification
1.	ΔABC is Rt. triangle	Given
2	Altitude BD	Given
3	$\angle BDC$ is a right angle	Definition of Altitude
4	$\angle ABC \cong \angle BDC$	all right angles are congruent
5	$\angle BCD \cong \angle BCA$	Reflexive Property of Congruence
6.	$\Delta ABC \sim \Delta BDC$	Angle-Angle (AA) Similarity

Item 4

Which equation is true?

A. $\sin 40° = \tan 50°$
B. $\cos 40° = \cos 50°$
C. $\sin 40° = \sin 50°$
D. $\cos 40° = \sin 50°$

The angles are complements, so the sine of an angle is equal to the cosine of the angle's complement.

* A, B, C are incorrect because they do not correspond to any trig. identities.

Item 5

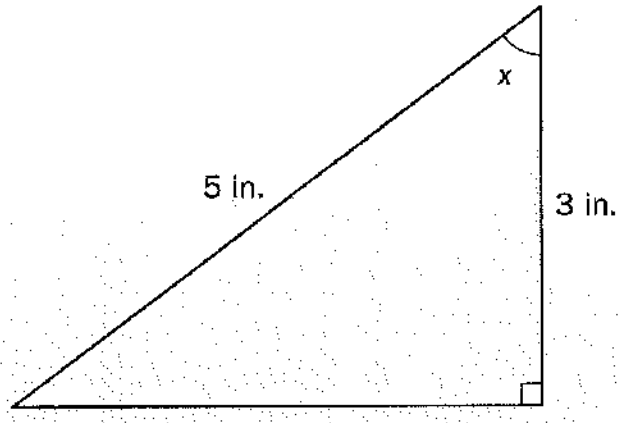
Which point is NOT on a circle with a center of (0, 0) and a radius of 10?

A. (0, 5)
B. (10, 0)
C. (0, –10)
D. (–8, 6)

The point (0, 5) is only 5 units away from the center of the circle.

Item 6 2 points

Study the triangle.



Explain how you can determine the value of sin *x*. Use the word theta in your explanation instead of the symbol. Write your answer on the lines provided.

Use the Pythagorean theorem to find that the length of the third side of the triangle is 4 inches. The sine of an angle is the ratio of the length of the opposite leg compared to the length of the hypotenuse. So, the sine of theta is equal to the ratio of 4 to 5

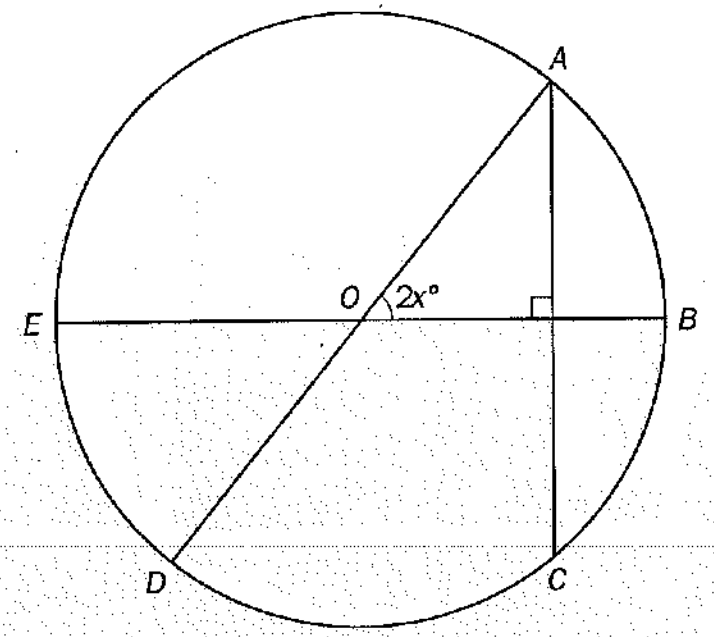
Item 7 2 points

Explain why the formula for the area of a sector is $A = \frac{nr^2\theta}{360}$, where r is the radius of the circle and θ is the measure in degrees of the central angle of the sector. Use the word pi in your explanation instead of the symbol π. Write your answer on the lines provided.

The first part of the formula shows the degree measure of the central angle of the sector divided by the degree measure of the entire circle. So, it represents the fraction of the circle that consists of the sector.
The second part of the formula shows pi times the radius squared, which is the area of the entire circle. So, the product of these two parts represents the fraction of the area of the circle that is included in the sector.

Item 8

Points *A*, *B*, *C*, *D*, and *E* are located on the circle O, as shown in this figure.



The measure of $\overset{\frown}{CD}$ is 80°. What is the value of x?

A. 50
B. 40
C. 35
(D.) 25

$\overset{\frown}{CD} = 80°$, so $m\angle DAC = 40°$
angles in a triangle add to 180
$\angle AOB = 50$ if $2x = 50$
$x = 25$

Item 9 2 points

A pyramid and a rectangular prism have congruent bases and equal heights. Write a statement comparing the volume of the figures, and explain your reasoning. Write your answer on the lines provided.

The volume of a rectangular prism is equal to the area of its base times its height, and the volume of a pyramid is equal to 1/3 of the area of its base times its height. Since the pyramid and the rectangular prism have congruent bases, their bases have the same area. Since the heights are congruent, they also have the same height. So, the volume of the pyramid is 1/3 of the volume of the rectangular prism.

Item 10

Which expression is equivalent to $-4\sqrt{28x} \cdot \sqrt{7x^3}$?

A. $-56x^2$
B. $4x^2\sqrt{7}$
C. $-4x\sqrt{196}$
D. $-28x$

$-4\sqrt{7\cdot4\cdot x} \cdot \sqrt{7\cdot x\cdot x\cdot x}$

factor out perfect square 4 and x^2

$-4\cdot2\cdot x^2\cdot 7 = -56x^2$

Item 11

Which value is an irrational number?

A. $4+\sqrt{7}$ Sum is an irrational number
B. $\sqrt{2}\sqrt{8}$
C. $\frac{\sqrt{3}\sqrt{12}}{5}$
D. $\sqrt{3}-\sqrt{3}$

B, C, D are rational numbers

Item 12 2 points

Part A: Explain how you could rewrite the expression $3x + 2(x^2 - 4x + 1) + 5x - 2$ to write it with the fewest number of terms. Write your answer on the lines provided.

First, distribute the factor 2 to each term of the expression in parentheses. Then combine the like terms by adding or subtracting their coefficients.

Part B: How many non-zero terms does the expression from Part A rewritten with the fewest number of terms contain?

The simplified expression will have only one term.

Item 13

A professional weather balloon is 10 yards in diameter. It is in the shape of a sphere. What is the volume of the weather balloon to the nearest cubic yard?

A. 59 cubic yards
B. 105 cubic yards
C. 294 cubic yards
D. 523 cubic yards

Volume of a sphere

$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi(5)^3$

$V = 523$

Item 14

The table defines a quadratic function.

x	y
−1	5
0	1
1	−1
3	1

Which is the average rate of change between $x = -1$ and $x = 1$?

A. undefined
B. $-\frac{1}{3}$
C. −3
D. −4

$(-1, 5)\ (1, -1)$

$\frac{5+1}{-1-1} = \frac{6}{-2} = -3$

Item 15 4 points

Part A: What are the zeros of the function $f(x) = x^2 - 6x + 8$? Explain how you determined your answer. Write your answer on the lines provided.

The zeros are 2 and 4. To find the zeros, I set the value of the function equal to 0. Then I factored the quadratic expression on the right side of the equation. Next, I used the Zero Product Property to set each factor equal to 0. Then I solved each of the resulting equations for x. These values of x are the zeros of the function.

Part B: Arturo made an error when finding the minimum value of the function $g(x) = x^2 - 6x + 10$. His work is shown below.

$$g(x) = x^2 - 6x + 10$$

$$g(x) = (x^2 - 6x - 9) + 10 + 9$$

$$g(x) = (x - 3)^2 + 19$$

The vertex is (3, 19), so the minimum value is 19.

Describe the error that Arturo made. Then give the correct minimum value of the function. Write your answer on the lines provided.

Part B: To complete the square, Arturo should have added 9 inside the parentheses instead of subtracting 9. And to keep the equation balanced, he should have subtracted 9 outside the parentheses instead of adding 9. The correct minimum value of the function is 1.

Item 16 Standard form: $(x-h)^2+(y-k)^2=r^2$ (h, k) center, r = radius

Study this equation of a circle.

$$x^2 - 6x + y^2 + 2y + 6 = 0$$

Which of these represents the center and radius of the circle?

A. center: (3, –1), radius: 4
B. center: (–3, 1), radius: 4
C. center: (3, –1), radius: 2
D. center: (–3, 1), radius: 2

* when the equation is changed to standard form using completing the square, the h, and k values are 3 and -1 and $r^2=4$ so $r=2$.

$x^2-6x+y^2+2y+6=0$
$x^2-6x+y^2+2y=-6$ complete square
$(x^2-6x+9)+(y^2+2y+1)=-6+9+1$
$(x-3)^2+(y+1)^2=4$

Item 17

One bag of lawn fertilizer can cover approximately 5,000 square feet. Mike's lawn is about 500 square feet. Mike fertilizes his lawn an average of 4 times per year. About how many full years will he be able to fertilize his lawn with one bag of fertilizer?

A. 2 years
B. 3 years
C. 9 years
D. 10 years

The fertilizer will run out halfway into the 3rd year lasting only 2 full years

$5000/500 = 10/4 = 2.5$

Item 18 2 points

How many zeros does this quadratic function have? Explain how you determined your answer. Write your answer on the lines provided.

$$f(x) = x^2 + 15x + 56$$

There are two zeros for the function. The zeros of the function is when the function equals zero. I set the expression equal to zero and factored the expression. Then I set each factor equal to zero and solved for x

Item 19 2 points

A student draws a card from a standard deck and then draws another card without replacing the first card. Explain why the probability of picking an ace on the first draw and the probability of picking a 7 on the second draw are NOT independent events. Write your answer on the lines provided.

When the first card is drawn from the deck, there are 52 cards to choose from. Because the first card is not replaced, there are only 51 cards to choose from when the second card is drawn. So, the result of picking an ace on the first draw affects the sample space and, therefore, the probability of picking a 7 on the second draw. So the events are not independent.

Item 20

When rolling a fair, six-sided number cube, what is the probability of rolling an even number or a number less than 3?

A. $\frac{5}{6}$

B. $\frac{2}{3}$

C. $\frac{1}{2}$

D. $\frac{1}{3}$

1, 2, 4, 6 4 way to roll an even number & a number less than 6; out of 6 outcome

$\frac{4}{6} = \frac{2}{3}$

Item 21

What is the probability of rolling a 5 on a fair, six-sided number cube if you know that you rolled an odd number?

A. $\frac{1}{6}$

B. $\frac{1}{3}$

C. $\frac{1}{2}$

D. $\frac{2}{3}$

Conditional probability; you know you rolled an odd number.

1, 3, 5 (odd numbers) out of total outcomes of 3 odd numbers

$\frac{1}{3}$