Practice A 10-3 Formulas in Three Dimensions

Match the letter of each formula to its name.

1. Euler's Formulaa. $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2}\right)$ 2. diagonal of a
rectangular prismb. V - E + F = 23. distance in three
dimensionsc. $d = \sqrt{\ell^2 + w^2 + h^2}$ 4. midpoint in three
dimensionsd. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$

Count the number of vertices, edges, and faces of each polyhedron. Use your results to verify Euler's Formula.

For Exercises 7–9, use the formula for the length of a diagonal to find the unknown dimension in each polyhedron. Round to the nearest tenth.

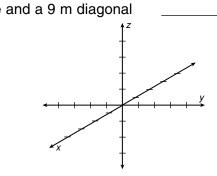
- 7. the length of a diagonal of a cube with edge length 3 in.
- 8. the length of a diagonal of a 7-cm-by-10-cm-by-4-cm rectangular prism
- 9. the height of a rectangular prism with a 6-m-by-6-m base and a 9 m diagonal
- A rectangular prism with length 3, width 2, and height 4 has one vertex at (0, 0, 0). Three other vertices are at (3, 0, 0), (0, 2, 0), and (0, 0, 4). Find the four other vertices. Then graph the figure.

Use the formula for distance in three dimensions to find the distance between the given points. Use the midpoint formula in three dimensions to find the midpoint of the segment with the given endpoints. Round to the nearest tenth if necessary.

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11. (0, 0, 0) and (2, 4, 6)

13. The world's largest ball of twine wound by a single individual weighs 17,400 pounds and has a 12-foot diameter. Roman climbs on top of the ball for a picture. To take the best picture, Lysandra moves 15 feet back and then 6 feet to her right. Find the distance from Lysandra to Roman. Round to the nearest tenth.







12. (1, 0, 5) and (0, 4, 0)

	LESSON Practice B	
10-3 Formulas in Three Dimensions	10-3 Formulas in	
Match the letter of each formula to its name. $(x_1 + x_2, y_1 + y_2, z_1 + z_2)$	Find the number of vertice Use your results to verify	es, edges, and faces of each polyhedron.
1. Euler's Formula b a. $M(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2})$ 2. diagonal of a		2.
rectangular prism b. $V - E + F = 2$		
3. distance in three dimensions c. $d = \sqrt{\ell^2 + w^2 + h^2}$	1	
4. midpoint in three	<u>$V = 6; E = 12; F =$</u>	
dimensions <u>d</u> d. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + }$ Count the number of vertices, edges, and faces of each polyhedron.	$(z_2 - z_1)^2$ <u>6 - 12 + 8 = 2</u>	7 - 12 + 7 = 2
Use your results to verify Euler's Formula.	Find the unknown dimens	ion in each polyhedron. Round to the nearest tenth.
5. 6.	3. the edge length of a cul	
		of a 15-mm-by-20-mm-by-8-mm rectangular prism 26.2 mi
<u>V = 5; E = 8; F = 5; 5 - 8 + 5 = 2</u> <u>V = 8; E = 12; F = 6; 8</u>	3-12+6 = 2 5. the length of a rectangu 21-in. diagonal	Ilar prism with width 2 in., height 18 in., and a 10.6 in
For Exercises 7–9, use the formula for the length of a diagonal to find the unknown dimension in each polyhedron. Round to the nearest tenth.		
 the length of a diagonal of a cube with edge length 3 in. 	5.2 in. Graph each figure.	7
8. the length of a diagonal of a 7-cm-by-10-cm-by-4-cm rectangular prism	12.8 cm 6. a square prism with bas length 4 units, height 2	units, 3 units, and base centered at (0, 0, 0)
9. the height of a rectangular prism with a 6-m-by-6-m base and a 9 m diagona	al <u>3 m</u> and one vertex at (0, 0,	o) Possible answer:
10. A rectangular prism with length 3, width 2, and height 4 (0, 0, 4) has one vertex at (0, 0, 0). Three other vertices are at	(0, 2, 4)	
(3, 0, 0), (0, 2, 0), and (0, 0, 4). Find the four other	(0, 0, 0)	(0, 0, 3)
vertices. Then graph the figure. (3, 2, 4)	(0, 0, 2)	(-3, 0, 1)
(3, 0, 0)	(0, 2, 0) (4, 0, 2)	y (0, -3, 0)
	(4, 0, 0)	
(3, 2, 0), (3, 2, 4), (3, 0, 4), (0, 2, 4)	(0, 0, 0)	(3, 0, 0)
Use the formula for distance in three dimensions to find the distance betwee given points. Use the midpoint formula in three dimensions to find the mid		
the segment with the given endpoints. Round to the nearest tenth if necess		
11. (0, 0, 0) and (2, 4, 6) 12. (1, 0, 5) and (0, 4, 0)	Find the distance between	the given points. Find the midpoint of the segment
7.5 units; (1, 2, 3) 6.5 units; (0.5, 2	2, 2.3)	Round to the nearest tenth if necessary.
13. The world's largest ball of twine wound by a single individual weighs	8. (1, 10, 3) and (5, 5, 5)	9. (-8, 0, 11) and (2, -6, -17)
17,400 pounds and has a 12-foot diameter. Roman climbs on top of the ball for a picture. To take the best picture, Lysandra moves	0.7 units; (3	, 7.5, 4) 30.3 units; (-3, -3, -3)
15 feet back and then 6 feet to her right. Find the distance from	9 feet	
Copyright @ by Holt, Rinehart and Winston. 19 All rights reserved.	Holt Geometry Copyright © by Holt, Rinehart and Winston. All rights reserved.	20 Holt Geomet
LESSON Practice C Solution In Three Dimensions The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid.		rmed by four or more polygons that intersect only at their edges.
Formulas in Three Dimensions The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid.	10-3 Formulas in A polyhedron is a solid for	med by four or more polygons that intersect only at their edges. polyhedrons. Cylinders and cones are not.
 Formulas in Three Dimensions The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. Each edge of the solid shown in the figure measures 5 in. 	10-3 Formulas in A polyhedron is a solid for	armed by four or more polygons that intersect only at their edges. polyhedrons. Cylinders and cones are not. Euler's Formula
 Formulas in Three Dimensions The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. Each edge of the solid shown in the figure measures 5 in. Find the length of AB. Give an exact answer and an answer 	10-31 Formulas in A polyhedron is a solid for Prisms and pyramids are p For any polyhedron with vertices, <i>E</i> edges, and <i>F</i>	The provided by four or more polygons that intersect only at their edges. bolyhedrons. Cylinders and cones are not. Euler's Formula V Example V - E + F = 2 Euler's Formula
 Formulas in Three Dimensions The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. Each edge of the solid shown in the figure measures 5 in. Find the length of AB. Give an exact answer and an answer rounded to the nearest tenth. 	10-3 Formulas in A polyhedron is a solid for Prisms and pyramids are For any polyhedron with	The probability of the polygons that intersect only at their edges. bolyhedrons. Cylinders and cones are not. Euler's Formula V V Example V = E + F = 2 4 - 6 + 4 = 2 2 = 2 Euler's Formula
 103 Formulas in Three Dimensions 1. The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. 2. Each edge of the solid shown in the figure measures 5 in. Find the length of <i>AB</i> Give an exact answer and an answer rounded to the nearest tenth. <u>5√2 in.; 7.1 in.</u> 	10-31 Formulas in A polyhedron is a solid for Prisms and pyramids are p For any polyhedron with vertices, <i>E</i> edges, and <i>F</i> faces,	The provided by four or more polygons that intersect only at their edges. Doubledrons. Cylinders and cones are not. Euler's Formula $V = \frac{Example}{V - E + F = 2}$ Euler's Formula 4 - 6 + 4 = 2 $V = 4, E = 6, F = 4$
 Formulas in Three Dimensions The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. Each edge of the solid shown in the figure measures 5 in. Find the length of AB. Give an exact answer and an answer rounded to the nearest tenth. 	10-31 Formulas in A polyhedron is a solid for Prisms and pyramids are pyram	The provided provided the second provided provi
 103 Formulas in Three Dimensions 1. The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. 2. Each edge of the solid shown in the figure measures 5 in. Find the length of AB. Give an exact answer and an answer rounded to the nearest tenth. <u>5√2 in.; 7.1 in.</u> 3. Find the length of AB if the bipyramid in Exercise 2 were based on a triangle rather than on a square. Found to the nearest tenth. 4. Find the length of AB if the bipyramid in Exercise 2 were based on 	10-3 Formulas in A polyhedron is a solid for Prisms and pyramids are p For any polyhedron with vertices, E edges, and F faces, V - E + F = 2. 8.2 in. The length of a diagonal	The dy four or more polygons that intersect only at their edges. bolyhedrons. Cylinders and cones are not. Euler's Formula V $ExampleV - E + F = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 4 = 24 - 6 + 6 + 4 = 24 - 6 + 6 + 24 - 6 + 6 + 24 - 6 + 6 + 24 - 6 + 6 + 24 - 6 + 6 + 24 - 6 + 6 + 24 - 6 + 6 + 24 - 6 + 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24 - 6 + 24$
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 103 Formulas in Three Dimensions 1. The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. 2. Each edge of the solid shown in the figure measures 5 in. Find the length of AB. Give an exact answer and an answer rounded to the nearest tenth. <u>5√2 in.; 7.1 in.</u> 3. Find the length of AB if the bipyramid in Exercise 2 were based on a triangle rather than on a square. Found to the nearest tenth. 4. Find the length of AB if the bipyramid in Exercise 2 were based on 	10-31Formulas inA polyhedron is a solid for Prisms and pyramids are pFor any polyhedron with vertices, E edges, and F faces, $V - E + F = 2$.8.2 in.Image: Descent content of the length of a diagonal with length ℓ , width w, an $d = \sqrt{\ell^2 + w^2}$	the provided in the sector of
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 103 Formulas in Three Dimensions 1. The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. 2. Each edge of the solid shown in the figure measures 5 in. Find the length of AB give an exact answer and an answer rounded to the nearest tenth. 5√2 in.; 7.1 in. 3. Find the length of AB if the bipyramid in Exercise 2 were based on a triangle rather than on a square. Round to the nearest tenth. 4. Find the length of AB if the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 7. The shape would be a flat hexagon; possible answer: The distance to of the bipyramid from the midpoint of a side (the slant height) woul in. The distance from the midpoint of a side to the center of the he apothem) would also be ⁵√3/2/₂ in. Therefore, the height AB would be 	10-31 Formulas in A polyhedron is a solid for Prisms and pyramids are For any polyhedron with vertices, <i>E</i> edges, and <i>F</i> faces, V - E + F = 2. 8.2 in. 11. 12. 13. 13. 14. 15.3 in. 15.3 in. 15.3 in. 16. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17. 	rmed by four or more polygons that intersect only at their edges. coupledrons. Cylinders and cones are not. Euler's Formula V Example V - E + F = 2 4 vertices, 6 edges, 4 faces iagonal of a Right Rectangular Prism d height h is $+ \frac{h^2}{r^2}$. angular prism with a 4 cm angular prism with a 4 cm angular for the diagonal of a right rectangular prism
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 103 Formulas in Three Dimensions 1. The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. 2. Each edge of the solid shown in the figure measures 5 in. Find the length of AB. Give an exact answer and an answer rounded to the nearest tenth. 5√2 in.; 7.1 in. 3. Find the length of AB if the bipyramid in Exercise 2 were based on a triangle rather than on a square. Round to the nearest tenth. 4. Find the length of AB if the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. Find the length of AB if the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 6. The distance from the midpoint of a side (the slant height) woul in. The distance from the midpoint of a side to the center of the he apotherm) would also be 5√3/2 in. Therefore, the height AB would b 6. The distance from A(-2, 7, 0) to B(3, 2, b) and from A to C(3, 2, c) is 10 unid D lies on BC so that AD is the shortest distance from A to BC. Find the coordinates of D without calculating. Explain how you got the answer. D(3, 2, 0); possible answer: Because B and C have the same x-a adinates, D must also have those x- and y-coordinates to lie on BC ference in length from A to BC is caused by changes in the z-coordinate as 7. A rectangular prism has vertices, in on particular order, at (-10, 8, 2), (-15, 8, 10), (-10, 5, 10), (-10, 5, 2), (-10, 8, 10), (-15, 5, 2), (-15, 8, 10), and (-15, 8, 2). Find the engeth of a diagonal of the prism. Round to the nearest tenth. 8. Find the coordinates of a point that is equidistant from each of the prism. Round to the nearest tenth. 	10-31 Formulas in A polyhedron is a solid for Prisms and pyramids are p For any polyhedron with vertices, <i>E</i> edges, and <i>F</i> faces, V - E + F = 2. 8.2 in. 5.3 in. The length of a diagonal with length ℓ , width w , and $d = \sqrt{\ell^2 + w^2}$ Find the height of a rect: by 3 cm base and a 7 cm $d = \sqrt{\ell^2 + w^2}$ Find the height of a rect: by 3 cm base and a 7 cm $d = \sqrt{\ell^2 + w^2}$ Find the height of a rect: by 3 cm base and a 7 cm $d = \sqrt{\ell^2 + w^2} + \hbar^2$ $24 = \hbar^2$ $4.9 cm \approx h$ Find the number of vertic Use your results to vertify 1. Vertices: 8; edges: 8 = 12 + 6 = 2	rmed by four or more polygons that intersect only at their edges. bolyhedrons. Cylinders and cones are not. Euler's Formula V Euler's Formula V Evample V Evample V Evample V Evample V Evample Euler's Formula V 4 , $E = 6, F = 4$ 2 = 2 4 vertices, 6 edges, 4 faces Indigonal of a Right Rectangular Prism d height <i>h</i> is $+ h^2$. angular prism with a 4 cm h diagonal. Formula for the diagonal of a right rectangular prism Substitute 7 for <i>d</i> , 4 for ℓ , and 3 for <i>w</i> . Square both sides of the equation. Simplify. Take the square root of each side. es, edges, and faces of each polyhedron. Euler's Formula. 2. 4
 ID31 Formulas in Three Dimensions 1. The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. 2. Each edge of the solid shown in the figure measures 5 in. Find the length of AB. Give an exact answer and an answer rounded to the nearest tenth. 5. Find the length of AB if the bipyramid in Exercise 2 were based on a triangle rather than on a square. Round to the nearest tenth. 3. Find the length of AB if the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 4. Find the length of AB if the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a hexagon instead of a square, describe what sort of shape would result. Explain your answer. The shape would be a flat hexagon; possible answer: The distance to of the bipyramid from the midpoint of a side to the center of the he apotherm) would also be 5√3/2 in. Therefore, the height AB would b 6. The distance from A(-2, 7, 0) to B(3, 2, 0) and from A to C(3, 2, c) is 10 uni D lies on BC so that AD is the shortest distance form A to BC. Find the coordinates of D without calculating. Explain how you got the answer. D(3, 2, 0); possible answer: Because B and C have the same x a dinates, D must also have those x - and y-coordinates to lie on BC is caused by changes in the z-coor the shortest distance occurs when D has the same z-coordinate as 7. A rectangular prism has vertices, in no particular order, at (-10, 8, 2), (-15, 8, 10), (-10, 5, 2), (-10, 8, 10), (-15, 5, 2), (-15, 8, 10), (-10, 5, 2), (-10, 8, 10), (-15, 5, 2), (-15, 8, 10), (-10, 5, 2), (-10, 8, 10), (-15, 5, 2), (-15, 8, 10), (-15, 8, 2). Find the length of a diagonal of the prism. Round to the nearest tent. 8. Find the coo	10-31 Formulas in A polyhedron is a solid for Prisms and pyramids are p For any polyhedron with vertices. <i>E</i> edges, and <i>F</i> faces, V - E + F = 2. 8.2 in. 5.3 in. The length of a diagonal with length ℓ , width <i>w</i> , an $d = \sqrt{\ell^2 + w^2}$ Find the height of a rect. by 3 cm base and a 7 cm $d = \sqrt{\ell^2 + w^2}$ Find the height of a rect. by 3 cm base and a 7 cm $d = \sqrt{\ell^2 + w^2}$ Find the height of a rect. by 3 cm base and a 7 cm $d = \sqrt{\ell^2 + w^2 + h^2}$ $24 = h^2$ 4.9 cm = h Find the number of vertic Use your results to vertify 1. S.6.5.6 Vertices: 8; edges: 8 - 12 + 6 = 2	the set of
 103 Formulas in Three Dimensions 1. The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. 2. Each edge of the solid shown in the figure measures 5 in. Find the length of AB. Give an exact answer and an answer rounded to the nearest tenth. 5√2 in.; 7.1 in. 3. Find the length of AB if the bipyramid in Exercise 2 were based on a triangle rather than on a square. Round to the nearest tenth. 4. Find the length of AB if the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 4. Find the length of AB if the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 6. If the bipyramid in Exercise 2 were based on a spentagon rather than on a square. Round to the nearest tenth. 7. The shape would be a flat hexagon; possible answer: The distance to of the bipyramid from the midpoint of a side (the slant height) woul in. The distance from the midpoint of a side to the center of the he apotherm) would also be 5√2 in. Therefore, the height AB would be 6. The distance from A(-2, 7, 0) to B(3, 2) and from A to C(3, 2, c) is 10 unin D lies on BC so that AD is the shortest distance from A to BC. Find the coordinates of D without calculating. Explain how you got the answer. D(3, 2, 0); possible answer: Because B and C have the same x- a dinates, D must also have those x- and y-coordinates to lie on BC or that AD is the same z-coordinate as 7. A nectangular prism has vertices, in no particular order, at (-10, 8, 2), (-15, 5, 10), (-10, 5, 2), (-15, 5, 10), (-15, 5, 2), (-15, 5, 10), (-15, 5, 2), (-15, 5, 10), (-15, 5, 2), (-15, 5, 10), (-15, 5, 2), (-15, 5, 10), (-15, 5, 2), (-15, 5, 10), (-15, 5, 2), (-15, 5, 10), (-15, 5, 2), (-15, 5, 10), (-15, 5, 2), (-15, 5, 10), (-15, 5, 2), (-15, 5, 1	10-31 Formulas in A polyhedron is a solid for Prisms and pyramids are p For any polyhedron with vertices. <i>E</i> edges, and <i>F</i> faces, V - E + F = 2. 8.2 in. 5.3 in. The length of a diagonal with length ℓ , width <i>w</i> , an $d = \sqrt{\ell^2 + w^2}$ Find the height of a rect. by 3 cm base and a 7 cm $d = \sqrt{\ell^2 + w^2}$ Find the height of a rect. by 3 cm base and a 7 cm $d = \sqrt{\ell^2 + w^2}$ Find the height of a rect. by 3 cm base and a 7 cm $d = \sqrt{\ell^2 + w^2 + h^2}$ $24 = h^2$ 4.9 cm = h Find the number of vertic Use your results to vertify 1. Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution	The provided of the equation. Substitute 7 formula to the equation. Substitute 7 formula to the equation. Substitute 7 for d, 4 for ℓ , and 3 for w. Square both sides of the equation. Simplify. Take the square root of each side. 12; faces: 6; Vertices: 6; edges: 10; faces: 6; Vertices: 6; edges: 10; faces: 6;
 103 Formulas in Three Dimensions 1. The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. 2. Each edge of the solid shown in the figure measures 5 in. Find the length of AB. Give an exact answer and an answer rounded to the nearest tenth. 5√2 in.; 7.1 in. 3. Find the length of AB if the bipyramid in Exercise 2 were based on a triangle rather than on a square. Round to the nearest tenth. 4. Find the length of AB if the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 6. The distance from the midpoint of a side (the slant height) would in. The distance from the midpoint of a side to the center of the he apothem) would also be 5√3/2 in. Therefore, the height AB would b 6. The distance from A(-2, 7, 0) to B(3, 2, b) and from A to C(3, 2, c) is 10 unid Diles on BC so that AD is the shortest distance from A to BC. Find the coordinates of D without calculating. Explain how you got the answer. D(3, 2, 0); possible answer: Because B and C have the same x-a dinates, D must also have those x- and y-coordinates to lie on BC is Caused by changes in the z-coordinates do the were the same x-a dinates, D, and (-16, 5, 2), (-15, 5, 10), (-10, 5, 2), (-10, 8, 10), (-15, 5, 10), (-10, 5, 2), (-10, 8, 10), (-15, 5, 2), (-15, 8, 10), (-10, 5, 10), (-10, 5, 2), (-15, 8, 10), (-10, 5, 2), (-10, 8, 10), (-15, 5, 10), and (-15, 8, 2), Find the energe of the signal of the prism. Round to the nearest tenth. 8. Find the coordinates of a point that is equidistant from each of the eight vertices of the prism. Find the dimensions of the prism based on the diagonal lengths given below. 	10-31 Formulas in A polyhedron is a solid for Prisms and pyramids are p For any polyhedron with vertices, <i>E</i> edges, and <i>F</i> faces, V - E + F = 2. 8.2 in. 5.3 in. 11 The length of a diagonal with length ℓ , width w , and $d = \sqrt{\ell^2 + w^2}$ 12 Sin. 13 The length of a diagonal with length ℓ , width w , and $d = \sqrt{\ell^2 + w^2}$ 14 the vertex 15 Sin. 16 Ind the height of a rect. 17 by a mbase and a 7 cm $d = \sqrt{\ell^2 + w^2 + h^2}$ $24 = h^2$ 4.9 cm = h 10 Joint 10 Sin. 10 Joint 10 Sin. 10 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 12 Joint 10 Sin. 13 Joint 10 Sin. 14 Joint 10 Sin. 15 Joint 10 Sin. 16 Joint 10 Sin. 17 Sin. 18 Joint 10 Sin. 19 Joint 10 Sin. 10 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 12 Joint 10 Sin. 13 Joint 10 Sin. 14 Joint 10 Sin. 15 Joint 10 Sin. 16 Joint 10 Sin. 17 Joint 10 Sin. 18 Joint 10 Sin. 19 Joint 10 Sin. 10 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 12 Joint 10 Sin. 13 Joint 10 Sin. 14 Joint 10 Sin. 15 Joint 10 Sin. 16 Joint 10 Sin. 17 Joint 10 Sin. 18 Joint 10 Sin. 19 Joint 10 Sin. 10 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 12 Joint 10 Sin. 13 Joint 10 Sin. 14 Joint 10 Sin. 15 Joint 10 Sin. 16 Joint 10 Sin. 17 Joint 10 Sin. 17 Joint 10 Sin. 18 Joint 10 Sin. 19 Joint 10 Sin. 19 Joint 10 Sin. 19 Joint 10 Sin. 19 Joint 10 Joint	rmed by four or more polygons that intersect only at their edges. polyhedrons. Cylinders and cones are not. Euler's Formula V Example V = E + F = 2 4 - 6 + 4 = 2 2 = 2 4 - 6 + 4 = 2 2 = 2 4 - 6 + 4 = 2 2 = 2 Euler's Formula iagonal of a Right Rectangular Prism of of a right rectangular prism of of a right rectangular prism of of a right rectangular prism of of a right rectangular prism 4 - 6 + 4 = 2 2 = 2 4 - 6 + 4 = 2 2 = 2 iagonal of a Right Rectangular Prism of of a right rectangular prism of of a right rectangular prism 4 - 6 + 4 = 2 2 = 2 iagonal of a Right Rectangular Prism of of a right rectangular prism iagonal. Formula for the diagonal of a right rectangular prism Substitute 7 for d , 4 for ℓ , and 3 for w . Square both sides of the equation. Simplify. Take the square root of each side. es. edges, and faces of each polyhedron. Euler's Formula. 2. 4 - 10 + 6 = 2 bion in each figure. Round to the nearest 12. 4. the height of a rectangular prism with a the square prism the
 103 Formulas in Three Dimensions 1. The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. 2. Each edge of the solid shown in the figure measures 5 in. Find the length of AB Give an exact answer and an answer rounded to the nearest tenth. 5√2 in.; 7.1 in. 3. Find the length of AB if the bipyramid in Exercise 2 were based on a triangle rather than on a square. Round to the nearest tenth. 4. Find the length of AB if the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 6. The distance from the midpoint of a side (the slant height) woul in. The distance from the midpoint of a side to the center of the he apothem) would also be 5√3/2 in. Therefore, the height AB would b 6. The distance from A(-2, 7, 0) to B(3, 2, b) and from A to C(3, 2, c) is 10 unit Diles on BC so that AD is the shortest distance from A to BC. Find the coordinates of D without calculating. Explain how you got the answer. D(3, 2, 0); possible answer: Because B and C have the same x- ad dinates, D must also have those x- and y-coordinates to lie on BC is caused by changes in the z-coordinates distance occurs when D has the same z-coordinate as 7. A rectangular prism has vertices, in no particular order, at (-10, 8, 2), (-15, 8, 0), (-15, 8, 2), (-16, 8, 2), Find the length of a diagonal of the prism. Round to the nearest tenth. 8. Find the coordinates of a point that is equidistant from each of the eight vertices of the prism in Exercise 7. 7. Yrone has eight 1-in. cubes. He arranges all eight of them to make different rectangular prisms. Find the dimensions of the prisms based 	10-31 <i>Formulas in</i> A polyhedron is a solid for Prisms and pyramids are p For any polyhedron with vertices, <i>E</i> edges, and <i>F</i> faces, V - E + F = 2. 8.2 in . 5.3 in . 11 The length of a diagonal with length ℓ , width <i>w</i> , and $d = \sqrt{\ell^2 + w^2}$ 12 The length of a rect . by 3 cm base and a 7 cm $d = \sqrt{\ell^2 + w^2} + h^2$ $24 = h^2$ 4.9 cm = h 13 the number of vertices: 14 the unknown dimenset int if necessary. 3. the length of the diagor by 8 cm by 11 cm rects	The provided of the second se
 ID31 Formulas in Three Dimensions 1. The distance from (0, 0, 0) to the surface of a solid is 4 units. Graph the solid. 2. Each edge of the solid shown in the figure measures 5 in. Find the length of AB. Give an exact answer and an answer rounded to the nearest tenth. 5√2 in.; 7.1 in. 3. Find the length of AB if the bipyramid in Exercise 2 were based on a triangle rather than on a square. Round to the nearest tenth. 4. Find the length of AB if the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 5. If the bipyramid in Exercise 2 were based on a pentagon rather than on a square. Round to the nearest tenth. 6. The distance from the midpoint of a side (the slant height) woul in. The distance from the midpoint of a side to the center of the he apotherm) would also be 5√3/2 in. Therefore, the height AB would be 6. The distance from the midpoint of a side to the cancer of the heapotherm) would also be 5√3/2 in. Therefore, the height AB would be 6. The distance from A(-2, 7, 0) to B(3, 2, b) and from A to C(3, 2, c) is 10 unit D lies on BC so that AD is the shortest distance from A to BC. Find the coordinates of D without calculating. Explain how you got the answer. D(3, 2, 0); possible answer: Because B and C have the same x-a dinates, D must also have those x- and y-coordinates to lie on BC ference in length from A to BC is caused by changes in the z-coordinates do a without calculating. Capian how you got the same x-a dinates, D must also have those x- and y-coordinates to lie on BC ference in length from A to BC is caused by changes in the z-coordinates do a werthous excursion of the eight vertices of the prism in Exercise 7. 7. A rectangular prism has vertices, in no particular order, at (-10, 8, 2), (-15, 8, 10), (-10, 5, 10), (-10, 5, 2), (-10, 8, 10), (-15, 5, 2), (-15, 5, 10), and (-15, 8, 2). Find the length of a diagonal of the prism. Round to th	10-31 Formulas in A polyhedron is a solid for Prisms and pyramids are p For any polyhedron with vertices, <i>E</i> edges, and <i>F</i> faces, V - E + F = 2. 8.2 in. 5.3 in. 11 The length of a diagonal with length ℓ , width w , and $d = \sqrt{\ell^2 + w^2}$ 12 Sin. 13 The length of a diagonal with length ℓ , width w , and $d = \sqrt{\ell^2 + w^2}$ 14 the vertex 15 Sin. 16 Ind the height of a rect. 17 by a mbase and a 7 cm $d = \sqrt{\ell^2 + w^2 + h^2}$ $24 = h^2$ 4.9 cm = h 10 Joint 10 Sin. 10 Joint 10 Sin. 10 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 12 Joint 10 Sin. 13 Joint 10 Sin. 14 Joint 10 Sin. 15 Joint 10 Sin. 16 Joint 10 Sin. 17 Sin. 18 Joint 10 Sin. 19 Joint 10 Sin. 10 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 12 Joint 10 Sin. 13 Joint 10 Sin. 14 Joint 10 Sin. 15 Joint 10 Sin. 16 Joint 10 Sin. 17 Joint 10 Sin. 18 Joint 10 Sin. 19 Joint 10 Sin. 10 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 12 Joint 10 Sin. 13 Joint 10 Sin. 14 Joint 10 Sin. 15 Joint 10 Sin. 16 Joint 10 Sin. 17 Joint 10 Sin. 18 Joint 10 Sin. 19 Joint 10 Sin. 10 Joint 10 Sin. 11 Joint 10 Sin. 11 Joint 10 Sin. 12 Joint 10 Sin. 13 Joint 10 Sin. 14 Joint 10 Sin. 15 Joint 10 Sin. 16 Joint 10 Sin. 17 Joint 10 Sin. 17 Joint 10 Sin. 18 Joint 10 Sin. 19 Joint 10 Sin. 19 Joint 10 Sin. 19 Joint 10 Sin. 19 Joint 10 Joint	The provided of the second se