Math 173 - Geometry

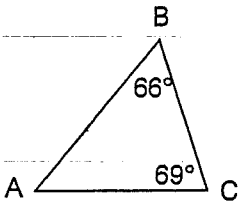
Exercise Set 61

(answers on back page)

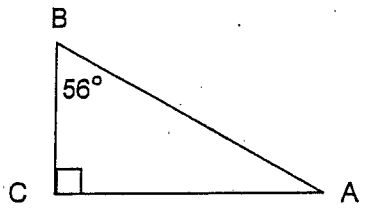
Exercise 1

Find ∠BAC in Question 1 and 2.

1.

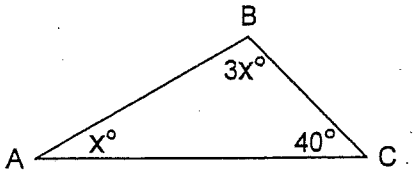


2.

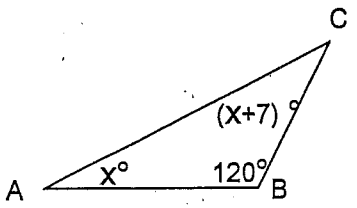


Find the value of x in Question 3 and 4.

3.

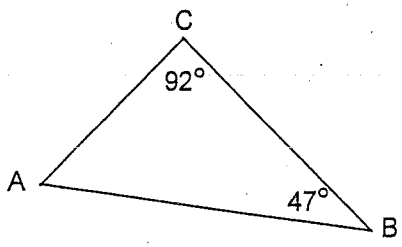


4.

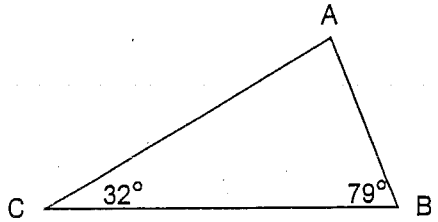


Find the size of ∠A in each of the following figures.

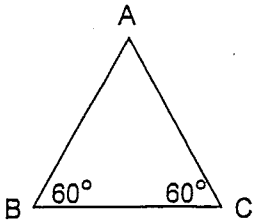
5.



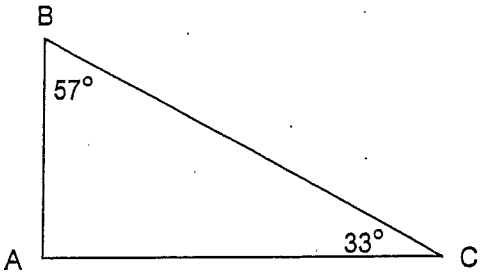
6.



7.



8.

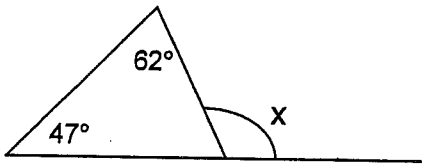


9. Classify the triangle in Question 1 using the sizes of angles.
10. Classify the triangle in Question 2 using the sizes of angles.
11. Classify the triangle in Question 3 using the sizes of angles.
12. Classify the triangle in Question 4 using the sizes of angles.
13. Classify the triangle in Question 5 using the sizes of angles.
14. Classify the triangle in Question 6 using the sizes of angles.
15. Classify the triangle in Question 7 using the sizes of angles.
16. Classify the triangle in Question 8 using the sizes of angles.

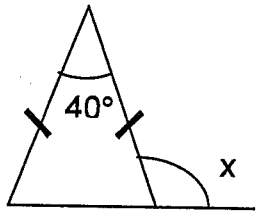
17. In ΔABC, if $\angle A = \angle B = 40°$, find $\angle C$.
18. In ΔABC, if $\angle A = \angle B$ and $\angle C = 40°$, find $\angle A$.
19. In ΔABC, if $\angle A = \angle B = \angle C$, find $\angle A$.
20. In ΔABC, if $\angle A = 2\angle B$ and $\angle C = 3\angle B$, find $\angle A$, $\angle B$ and $\angle C$.
21. In ΔABC, if $\angle A = 2\angle B$ and $\angle C = 3\angle A$, find $\angle A$, $\angle B$ and $\angle C$.
22. In ΔABC, if $\angle A = \angle B + 10°$ and $\angle C = \angle A + 10°$, find $\angle A$, $\angle B$ and $\angle C$.
23. Is it possible for a triangle to have two right angles? Explain briefly.
24. Is it possible for a triangle to have two obtuse angles? Explain briefly.
25. In ΔABC, $a = 10$, $b = 7$. What is the possible range of c?
26. In ΔABC, $a = 12$, $c = 5$. What is the possible range of b?
27. In ΔABC, $a = 3$, $b = 3$. What is the possible range of c?

Find the unknown marked angles in Questions 28 – 34.

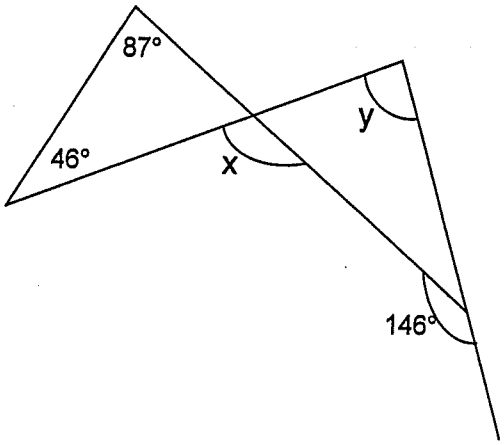
28.



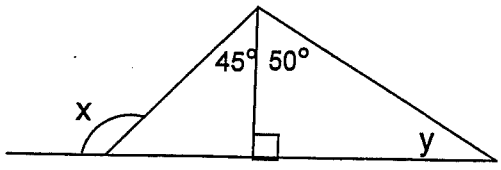
29.



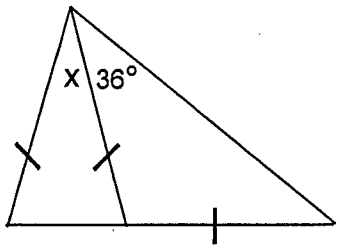
30.



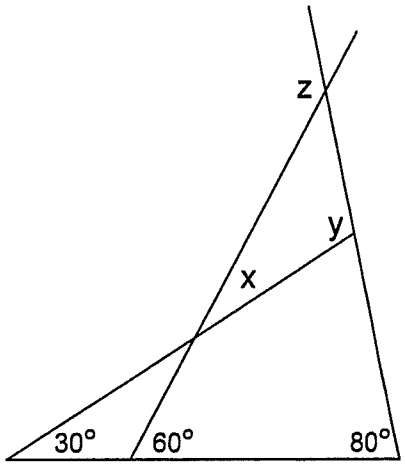
31.



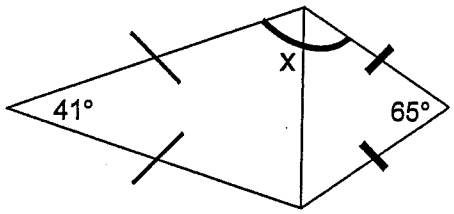
32.



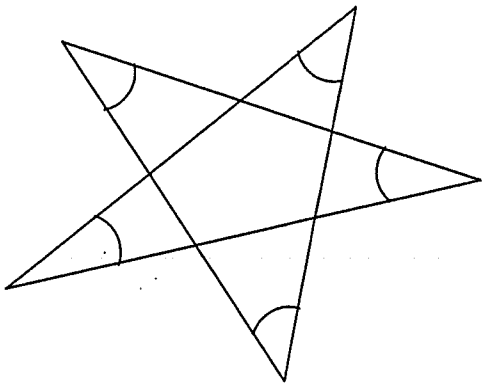
33.



34.



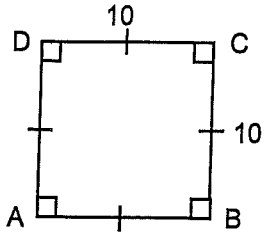
35. Find the sum of all vertex angles of a star.

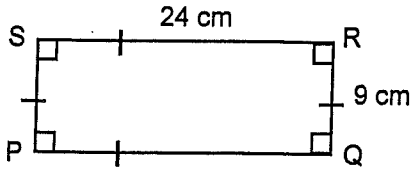


36. Find the value (to 2 decimal places) of the unknown variable:

(a) $x^2 = 9^2 + 16^2$
(b) $a^2 = 7^2 + 10^2$
(c) $35^2 = x^2 + 8^2$
(d) $13^2 = 4^2 + y^2$
(e) $26^2 = z^2 + 10^2$

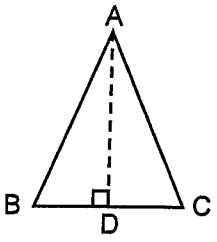
37. Find the length of the diagonal AC of the square ABCD.



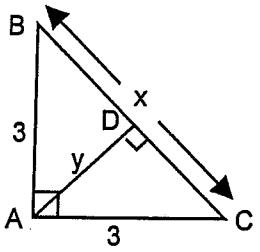


38. Find the length of the diagonal PR of the rectangle PQRS.

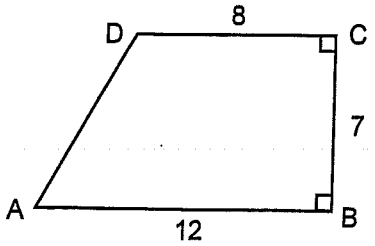
39. ΔABC is an isosceles triangle with AB = AC = 13 cm, and base BC = 10 cm. Find the length of the altitude AD.
(Hint: The altitude AD bisects BC.)



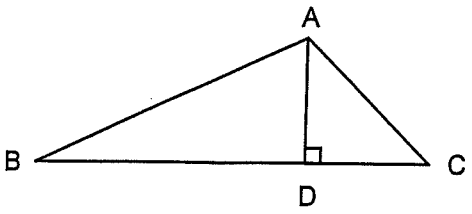
40. Find the values of x and y.
(Hint: The altitude AD bisects BC.)



41. Find AC and BD.

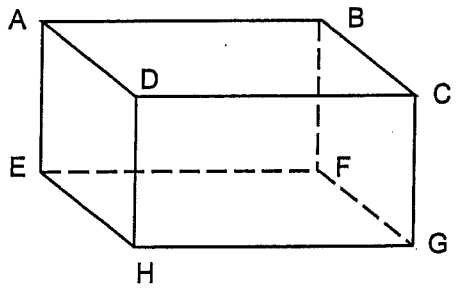


42. AB = 13 cm, BD = 12 cm and AC = 8 cm. Find AD and DC.



43. In the figure for the previous question, AB = 26 cm, AD = 10 cm and BC = 34 cm. Find BD and AC.

44. ABCDEFGH is a rectangular box where AB = 12 cm, AD = 9 cm and AE = 8 cm. Find (a) BD, (b) BH.



45. In the figure for the previous question, ABCDEFGH is a rectangular box where AB = 12 cm, BD = 13 cm and DH = 12 cm. Find (a) AD, (b) BH.

In Questions 46 - 55, find the distance between A and B.

46. A = (3, 7), B = (6, 9)
47. A = (-2, 7), B = (2, 9)
48. A = (-2, -4), B = (16, 9)
49. A = (0, 0), B = (6, 8)
50. A = (0, 0), B = (12, 5)
51. A = (0, 0), B = (12, -5)
52. A = (0, 0), B = (-12, 5)
53. A = (0, 0), B = (-12, -5)
54. A = (0, 0), B = (5, 12)
55. A = (3, 7), B = (15, 12)

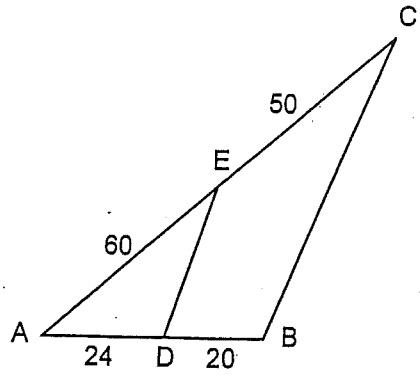
Math 173 - Geometry

Exercise Set G2

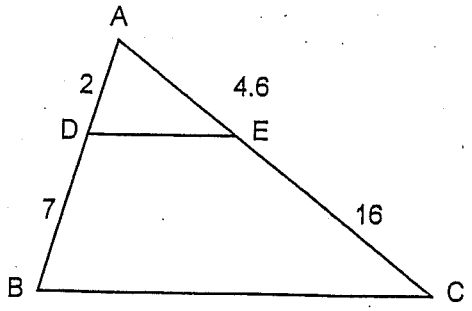
Exercise 2

In Questions 1 – 4, is DE // BC?

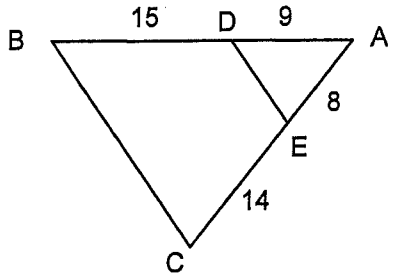
1.



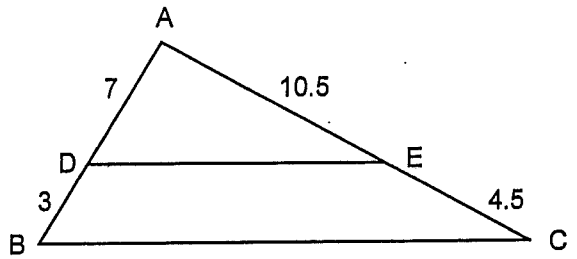
2.



3.



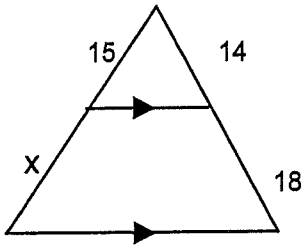
4.



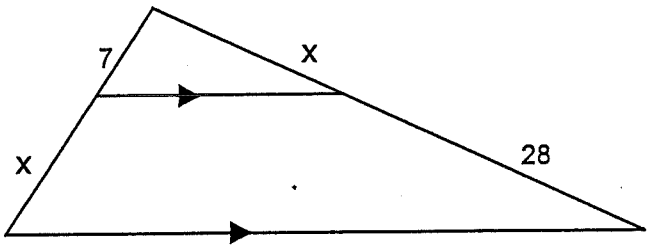
5. In the figure for question 1, if DE = 32, find the length of BC.
6. In the figure for question 2, all lengths unchanged but EC. What is the length of EC to make DE // BC?
7. In the figure for question 2, all lengths unchanged but AE. What is the length of AE to make DE // BC?
8. In the figure for question 3, all lengths unchanged but EC. What is the length of EC to make DE // BC?
9. In the figure for question 3, all lengths unchanged but BD. What is the length of BD to make DE // BC?
10. In the figure for question 4, if DE = 12, find the length of BC.

Find the unknown(s) in Questions 11 - 14.

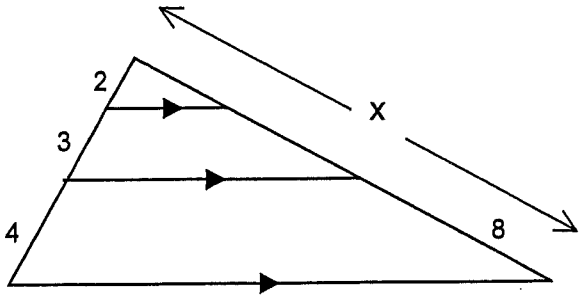
11.



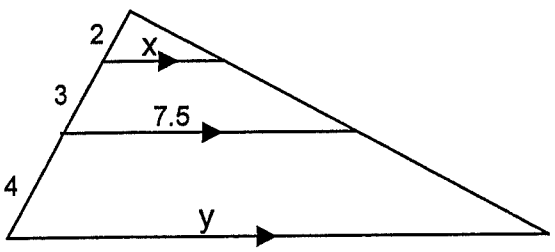
12.



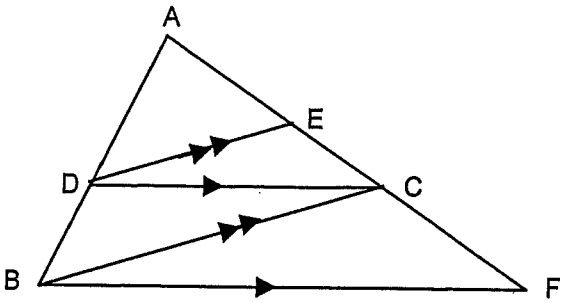
13.

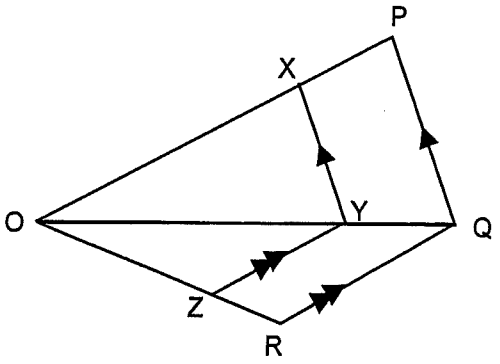


14.



15. ADB and AECF are straight lines such that DE // BC, DC // BF.
Prove that $\frac{AE}{EC} = \frac{AC}{CF}$.

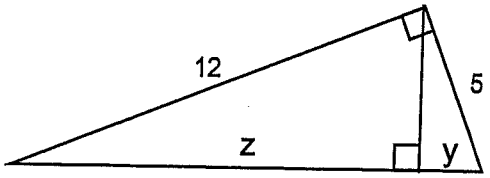




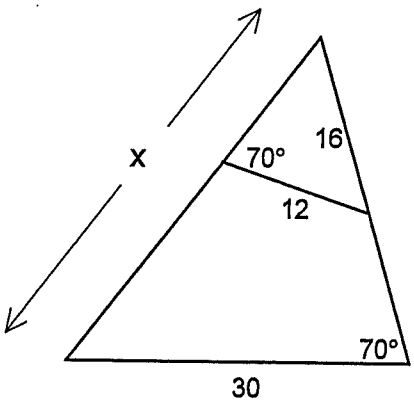
16. OXP, OYQ and OZR are straight lines such that XY //PQ and YZ // QR. Prove that XZ // PR.

Find the marked length(s) in Questions 17 - 21.

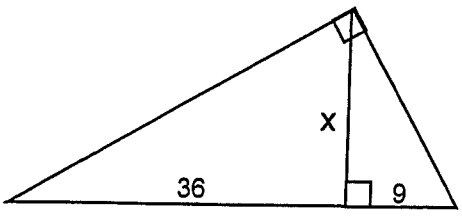
17.



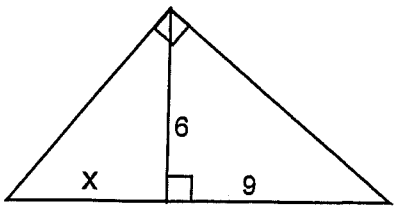
18.



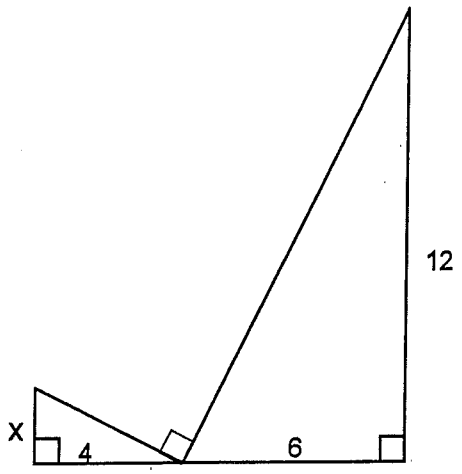
19.

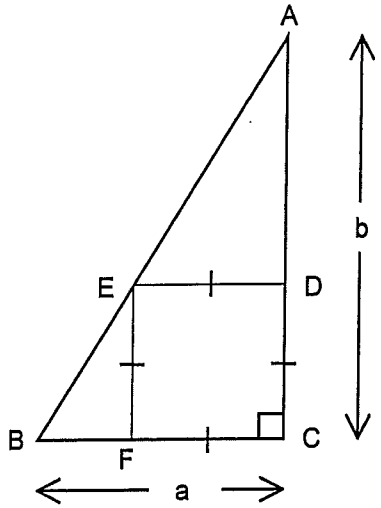


20.



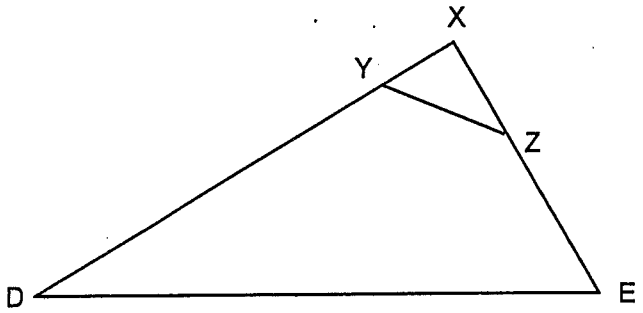
21.





22. ΔABC is a right triangle with the right angle at vertex C and CDEF is a square. Prove that $CD = \dfrac{ab}{a+b}$

23. XY = 2, XZ = 3, YZ = 4, ZE = 5 and YD = 10. Find the perimeter of ΔXDE.



24. Suppose a man 2 m tall casts a shadow 3 m long. At the same time a building casts a shadow 120 m long. What is the height of the building?

25. Suppose a stick, 3 m long, casts a shadow 4.5 m long. At the same time, a tree casts a shadow 20 m long. Find the height of the tree.

Each of the following is the ratio of lengths of corresponding sides of two similar triangles. In each case, evaluate the ratio of the areas of the triangles.

26.	5 : 3	27.	4 : 6	28.	3 : 7
29.	5 : 100	30.	3.5 : 6	31.	1 : 7
32.	4 : 1	33.	4 : 6	34.	$1 : \sqrt{2}$

Each of the following is the ratio of lengths of corresponding sides of two similar polygons. In each case, evaluate the ratio of the areas of the polygons.

35.	9 : 1	36.	2 : 5	37.	3.5 : 7.5
38.	500 : 100	39.	3.5 : 700	40.	1000 : 7000
41.	$5 : \sqrt{5}$	42.	$\sqrt{6} : 6$	43.	$1 : \sqrt{2}$

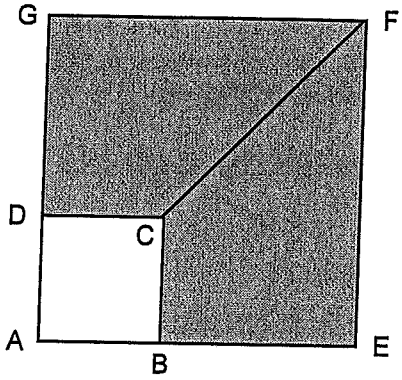
Each of the following is the ratio of the areas of two similar triangles. In each case, evaluate the ratio of the lengths of the corresponding side of the triangles.

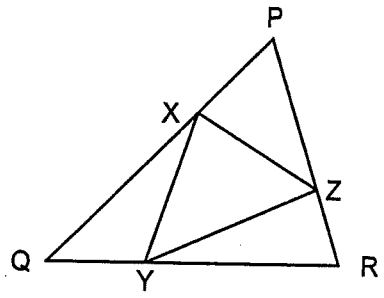
44.	9: 1	45.	16 : 25	46.	25 : 36
47.	1600 : 900	48.	144 : 25	49.	1 : 4
50.	100 : 100	51.	$\sqrt{52} : \sqrt{13}$	52.	$\sqrt{208} : \sqrt{13}$

53. If $\Delta ABC \sim \Delta XYZ$, BC = 7 cm, YZ = 10 cm and the area of ΔXYZ is 42 cm^2, find the area of ΔABC

54. If the area of ΔABC is 25 cm^2, area of ΔDEF is 4 cm^2, AC = 3 cm and $\Delta ABC \sim \Delta DEF$, find the length of DF.

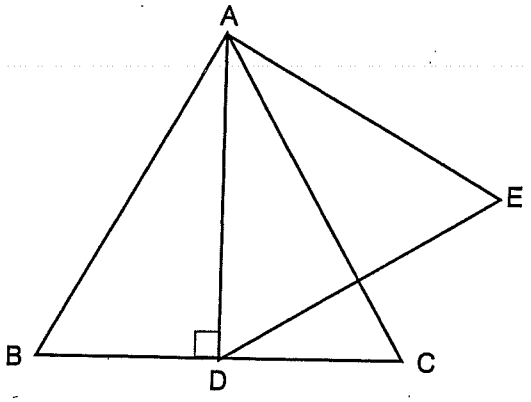
55. ABCD and AEFG are squares. If the areas of ABCD and the shaded part BEFGDC are respectively 25 cm^2 and 144^2 cm, find CF.





56*. $\frac{PX}{XQ} = \frac{QY}{YR} = \frac{RZ}{ZP} = \frac{1}{2}$. If the area of ΔPQR is 9 cm^2, find the area of ΔXYZ.

57. ΔABC and ΔADE are equilateral triangles. If the area of ΔABC is 3 cm^2, find the area of ΔADE.



58. Use the intercept theorem to prove the midpoint theorem.

Math 173
Answers of Suggested Geometry Problems

G.1 Triangles

1. $\angle BAC = 45°$ 3. $x = 35°$ 4. $x = 26.5°$ 21. $\angle A = 40°$, $\angle B = 20°$, $\angle C = 120°$
24. No, a triangle cannot have two angles of size larger than 90° since the sum of the angles would then be more than 180°.
28. $x = 109°$ 29. $x = 110°$ 30. $x = 133°$, $y = 99°$ 31. $x = 135°$, $y = 40°$ 32. $x = 36°$
33. $x = 30°$, $y = 110°$, $z = 140°$ 34. $x = 127°$ 35. sum $= 180°$ 36.(c) $x \approx 34.07$
38. $PR = \sqrt{657} \approx 25.63$ cm 40. $x = 3\sqrt{2}$, $y = \frac{3\sqrt{2}}{2}$
42. $AD = 5$ cm, $DC = \sqrt{39} \approx 6.2$ cm 44. $BD = 15$ cm, $BH = 17$ cm 48. $d = \sqrt{493}$

G.2 Similar Triangles

11. $x = \frac{135}{7} \approx 19.29$ 12. $x = 14$ 13. $x = 18$ 14. $x = 3$, $y = 13.5$ 17. $y = \frac{25}{13}$, $z = \frac{144}{13}$
18. $x = 40$ 19. $x = 18$ 20. $x = 4$ 21. $x = 2$ 23. perimeter $= 36$
24. height $= 80$ m 32. 16 : 1 44. 3 : 1 54. DF $= 1.2$ cm 55. ~~CF $= 7\sqrt{2} \approx 9.9$ cm~~
CF $= 8\sqrt{2}$