## Index

A
30°-60°-90° right triangles
finding sine and cosine of 30°, 496
finding tangent with, 489
side lengths of, 471, 473
30°-60°-90° Triangle Theorem
( <b>Thm. 9.5</b> ), 473
45°-45°-90° (isosceles) right triangles
finding sine and cosine of 30°, 496
side lengths, 471, 472
in standard position, 462
45°-45°-90° Triangle Theorem
( <b>Thm. 9.4</b> ), 472
AA, See Angle-Angle (AA) Similarity
Theorem (Thm. 8.3)
AAS, See Angle-Angle-Side (AAS)
<b>Absolute value,</b> finding, 1
Acute angle, 39
Acute triangle
in circumscribed circle, 311
classifying by angles, 232
classifying by Pythagorean
inequalities, 467
orthocenter of, 322
<b>Addition Property of Equality, 92</b>
Adjacent angles, 48–49
Adjacent arcs, 539
Ailles rectangle, 476
<b>Algebraic Properties of Equality, 92</b>
Algebraic reasoning, 91–95, 117
distributive property, 93
other properties of equality, 94
properties of equality, 92
Alternate exterior angles, 128
<b>Alternate Exterior Angles Converse</b>
( <b>Thm. 3.7</b> ), 139
<b>Alternate Exterior Angles Theorem</b>
( <b>Thm. 3.3</b> ), 132
exploring converses, 137
Alternate interior angles, 128
<b>Alternate Interior Angles Converse</b>
( <b>Thm. 3.6</b> ), 139
proving theorems about parallel
lines, 140
<b>Alternate Interior Angles Theorem</b>
( <b>Thm. 3.2</b> ), 132
exploring converses, 137
proof of, 134
Altitude of cone, 642
Altitude of triangle
defined, 321
examples of segments and points in

triangles, 300, 323

```
using, 319, 321-323, 351
"and" (intersection), 694–695
Angle(s)
  and arc measures in circles, 561-563
  circumscribed, 564
  classifying, and types of, 39
  congruent, 40
  construction, copying an angle, 40
  corresponding (See Corresponding
        angles)
  defined, 38
   diagram interpretation, 51
   finding angle measures, 47, 49, 50
        (See also Angle measures)
  inscribed, 553-555, 584
   measuring and constructing, 37–42,
        58
  naming, 38
   pairs of, describing, 47–51, 58
     adjacent angles, 48-49
     complementary angles, 48-49
     linear pair, 50
     supplementary angles, 48-49
      vertical angles, 50
   pairs of, formed by transversals, 128
     alternate exterior angles, 128
     alternate interior angles, 128
     consecutive interior angles, 128
     corresponding angles, 128
   proof of Symmetric Property of
        Angle Congruence, 102, 110
   Properties of Angle Congruence
        (Thm. 2.2), 101
  of triangles, 231-235, 290
     angle measures of triangles,
         233-235
     classifying triangles by sides and
        angles, 232–233
     relating to sides, 335, 337–338
Angle Addition Postulate
        (Post. 1.4), 41
Angle-Angle-Side (AAS)
   congruence, 271, 273
     identifying congruent triangles,
   using Law of Sines to solve triangle,
```

**Theorem (Thm. 5.11),** 271

**Theorem (Thm. 8.3),** 428

Angle-Angle (AA) Similarity

triangle similarity theorems

compared, 439

proof of, 428

```
Angle bisector(s)
                                            construction, bisecting an angle, 42
                                            defined, 42
                                            examples of segments and points in
                                                  triangles, 300, 323
                                            finding angle measures, 42
                                            points on, 301
                                            proportionality in triangle, 449
                                            using, 304-305
                                         Angle Bisector Theorem
                                                  (Thm. 6.3), 304
                                            converse of, 304
                                         Angle measures
                                            in kite, 401
                                            of polygons
                                               exterior, 362-363
                                               interior, 360-362
                                            in regular polygons, 611
                                            in rhombus, 390
                                            of triangles, 233–235
                                            types of angles, 39
                                            using properties of equality with, 94
                                         Angle of depression, 497
                                         Angle of elevation, 490
                                         Angle of rotation, 190
                                         Angle-Side-Angle (ASA)
                                            congruence, 270, 272, 273
                                               copying a triangle using ASA,
                                            using Law of Sines to solve triangle,
                                                  510
                                         Angle-Side-Angle (ASA) Congruence
                                                  Theorem (Thm. 5.10), 270
                                         Angles Inside the Circle Theorem
                                                  (Thm. 10.15), 563
                                         Angles Outside the Circle Theorem
                                                  (Thm. 10.16), 563
                                         Another Way
                                            corresponding angles, 132
                                            probability, sample space and
                                                  outcomes, 668
                                            segments of secants and tangents,
                                                  572
                                            sketching a diagram, 86
                                            solving right triangle, 503
                                            Table of Trigonometric Ratios, 502
Angle-Angle-Side (AAS) Congruence
                                            triangles and Laws of Cosines or
                                                  Sines, 511
                                         Apothem of regular polygon, 609,
                                                  611
                                         Arc Addition Postulate (Post. 10.1),
                                                  539
                                         Arc length, 595–596
```

using, 429-430

A	Davida Thannana (00	
Arc measures, 537–541, 583	Bayes' Theorem, 690	perpendicular to diameter, 545
finding, 538–539	Between, 14	using congruent chords
finding from angle relationships in	Biconditional statement(s)	to find arc measure, 546
circles, 562–563	defined, and writing, 69	to find circle's radius, 548
finding with congruent chords, 546	and definitions, 230	using diameter, 547
identifying congruent arcs, 540	triangles, equilateral and	using perpendicular bisectors, 547
of intercepted arc, 555	equiangular, 253	Circle(s), 526, See also Diameter;
of minor and major arcs, 538	<b>Binomial distribution(s),</b> 707–710,	Radius, of circle
proving circles are similar, 541	716	angle relationships in circles,
Area	constructing, 710	561–565, 584–585
of circle, 601–602	defined, 709	finding angle and arc measures,
in coordinate plane, 29–33, 57	interpreting, 710	562–563
finding, 31	Binomial experiments, 709	using circumscribed angles, 564
finding after dilation, 416	Binomials, multiplying, 527	arc measures, 537–541, 583
of kite, 610	Birthday problem, 706	identifying congruent arcs, 540
of regular polygons, 609-610,	<b>Bisecting angles</b> , 42, <i>See also</i> Angle	proving circles are similar, 541
612–613, 657	bisector(s)	area of, 601–602, 656
of rhombus, 610	Bisecting segments, See Segment	
of sectors, 601, 604–605		chords, 545–548, 583
of similar polygons, 421	bisector(s)	circumference of, 594
of triangle, square, and rectangle, 31	Bisector, perpendicular, See	circumscribed about triangle,
of triangle, using trigonometric	Perpendicular bisector(s)	311–312
ratios, 508	Bisectors of triangles, 309–314, 350	in coordinate plane, 575–578, 586
using to find probability, 670	angle bisectors of triangle, 309	equations of circles, 576–577
Areas of Similar Polygons	circumcenter of triangle, 310–312	writing coordinate proofs
( <b>Thm. 8.2</b> ), 421	circumscribing circle about triangle,	involving circles, 578
Arithmetic mean, compared to	311–312	defined, 528, 530
geometric mean, 477, 484	incenter of triangle, 313–314	drawing by using string, 529
<b>Arithmetic sequence,</b> <i>n</i> th term of, 63	inscribing circle within triangle, 314	inscribed angles, 553-555, 584
ASA, See Angle-Side-Angle (ASA)	perpendicular bisectors of triangle,	inscribed polygons, 553, 556–557,
Auxiliary line, 234	309	584
Axiom(s), 12		lines and segments that intersect
Axis of revolution, 620		circles, 529–533, 582
Axis of Tevolution, 020	Cavalieri, Bonaventura, 626	and tangents, 529–533
B	Cavalieri's Principle, 626	radius, finding, 532
	Center of arc, 40	relationships with tangent circles,
Base		528
of cone, 642	Center of circle, 528, 530	
of isosceles triangle, 252	Center of dilation, 208	segment relationships in circles, 569–572, 585
of solid, 618	Center of regular polygon, 609, 611	
Base angles	Center of rotation, 190	Circular arc, 537
of isosceles triangle, 252	Center of sphere, 648	Circular cone, 642, See also Cones
of trapezoid, 398	Center of symmetry, 193	Circumcenter of triangle
Base Angles Theorem (Thm. 5.6), 252	Central angle of circle	circumscribing circle about triangle,
converse of, 252	defined, 537, 538	312
using, 253	and inscribed angles, 553	defined, 310
Bases (of trapezoid), 398	Central angle of regular polygon, 611	examples of segments and points in
Basics of geometry, 1	Centroid (of triangle)	triangles, 323
angles, describing pairs of, 47–51,	defined, 320	finding, 312
58	examples of segments and points in	types of triangles with
angles, measuring and constructing,	triangles, 323	circumscribed circles, 311
37–42, 58	finding, 321	Circumcenter Theorem
midpoint and distance formulas,	Centroid Theorem (Thm. 6.7), 320	( <b>Thm. 6.5</b> ), 310
19–23, 57	Ceva's Theorem, 452	Circumference, area, and volume, 590
perimeter and area in coordinate	Chord of a sphere, 648	arc length, 593, 595–596, 656
plane, 29–33, 57	Chord(s) of circles, 545–548, 583	areas (See also Area)
points, lines, and planes, 3–7, 56	defined, 530	of circles and sectors, 601–605,
segments, measuring and	intersection with tangent on circle,	656
constructing, 11–15, 56	562	of polygons, 609–613
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	302	or por, 6010, 007 013

circumference, 593–597, 656	transformation order, 192	defined, 66
surface areas	triangle congruence, 271	in if-then form, 66
of cones, 641–642, 659–660	triangles, proportional, 479	negation, 66
of spheres, 647–649, 660	triangles, redrawing, 255	related conditionals, 67
three-dimensional figures, 617–620,	write ratio of volumes, 630	true or false determination, 65
657–658	Common external tangent, 531	truth tables, 70
volumes	Common internal tangent, 531	using definitions, 68
of cones, 641, 643–644, 659–660	Common tangent, 531	writing, 66–67
of prisms and cylinders, 625–630,	Compass, 13	Cones
658	Complement of event, 669–670	frustum of, 646
of pyramids, 635-638, 659	Complementary angles	lateral surface of, 642
of spheres, 647, 650–651, 660	defined, 48-49	surface area of, 641–642
Circumference, of circle, 594	proving cases, 107	volume of, 641, 643–644, 659–660
Circumscribed angle, 564	sine and cosine of, 494	Congruence and transformations,
Circumscribed Angle Theorem	Completing the square	199–203, 223
( <b>Thm. 10.17</b> ), 564	solving quadratic equations by, 527	congruence transformations, 201
Circumscribed circle, 556–557	in standard equation of circle, 577	identifying congruent figures, 200
Classifying	Component form of vector, 174	reflections in intersecting lines, 199,
angles, 39	Composite solids, volumes, 630, 638,	203
lines, pairs of, 124, 125	644, 651	reflections in parallel lines, 199, 202
polygons, 30, 31, 361	Composition of rigid motions,	using theorems about, 202–203
quadrilaterals, 358, 389, 402	239–240	Congruence, properties of, 101–102
solids, 617, 618	Composition of transformations, 176	Congruence transformation, 201
triangles by sides and angles,	Composition Theorem (Thm. 4.1), 176	Congruent angles, 40
232–233	Compositions	Congruent arcs, identifying, 540 Congruent Central Angles Theorem
Clockwise rotation, 190	performing, 176	(Thm. 10.4), 540
<b>Coin flip,</b> 668, 699, 707	performing with rotations, 192	Congruent circles, 540
Coincident lines, example of, 124, 125	Compound event(s), 694–695	Congruent Circles Theorem
Collinear points, 4	Compound inequalities, writing, 299	(Thm. 10.3), 540
Combination(s), 669, 702–703, 716	Concave polygons, 30	Congruent Complements Theorem
counting, 702	Concentric circles, 531	(Thm. 2.5), 107
defined, 702	Concept Summary	Congruent Corresponding Chords
finding probability using, 703	Interpreting a Diagram, 51	Theorem (Thm. 10.6), 546
formula, 702–703	Segments, Lines, Rays, and Points	Congruent figures
Common Errors	in Triangles, 323	defined, 200
adjacent angles, 48	Triangle Congruence Theorems, 273	using properties of, 241
angle approximation, 565	Triangle Similarity Theorems, 439	Congruent Parts of Parallel Lines
angle names and angle measures, 49	Types of Proofs, Symmetric	Corollary, 374
angle symbol compared to less than	Property of Angle	Congruent polygons, 239–242, 290
symbol, 337	Congruence, 110	using corresponding parts, 240–241
angles and vertex, 254	Ways to Prove a Quadrilateral Is a	using Third Angles Theorem
area of semicircle, 605	Parallelogram, 379	(Thm. 5.4), 242
calculator, inverse sine feature, 511	Writing a Two-Column Proof, 102	Congruent segments, 13
conditional statement and	Conclusion, in conditional statement,	Congruent Supplements Theorem
contrapositive, 67	66	( <b>Thm. 2.4</b> ), 107
diameter of sphere, 649	Concurrent lines, rays, or segments,	Congruent triangles, 228
geometric mean of right triangle,	310	angles of triangles, 231–235, 290
481	Conditional probability	congruent polygons, 239-242, 290
indirect proofs, 337	comparing, 687	coordinate proofs, 283–286, 294
linear pair of angles, 50	defined, 677	equilateral and isosceles triangles,
naming an angle, 38	finding a table, 679	251–255, 291
pay attention to units, 596	finding with conditional relative	proving triangle congruence
probability	frequencies, 686	by ASA and AAS, 269–273,
and binomial distribution, 710	Conditional relative frequency,	292–293
overlapping events, 695	685–686	by SAS, 245–248, 291
protractor scales, 39	Conditional statement(s), 65–70, 116	by SSS, 261–265, 292
rays, 5	biconditional statements, 69	using, 277–280, 293

Conjecture	Converse of the Angle Bisector	Corollary to the Converse of Base
defined, 76	Theorem (Thm. 6.4), 304	Angles Theorem (Cor. 5.3),
making and testing, 77	Converse of the Base Angles	253
reasoning with, 75	Theorem (Thm. 5.7), 252	Corollary to the Polygon Interior
writing, about isosceles triangles,	Converse of the Hinge Theorem	Angles Theorem (Cor. 7.1),
251	(Thm. 6.13), 344	361
writing, on angles of triangle, 231	Converse of the Perpendicular	Corollary to the Triangle Sum
Consecutive integers, 77	Bisector Theorem	Theorem (Cor. 5.1), 235
Consecutive interior angles, 128	(Thm. 6.2), 302	Rectangle Corollary (Cor. 7.3), 388
Consecutive Interior Angles	Converse of the Pythagorean	Rhombus Corollary (Cor. 7.2), 388
Converse (Thm. 3.8), 139	Theorem (Thm. 9.2), 466	Square Corollary (Cor. 7.4), 388
Consecutive Interior Angles Theorem	Converse of the Triangle	Corollary to a theorem, defined, 235
(Thm. 3.4), 132	Proportionality Theorem	Corresponding angles
exploring converses, 137	(Thm. 8.7), 446	in congruent polygons, 240-241
Consecutive vertices, 360	Corresponding Angles Converse	defined, 128
Constant of proportionality, 597	(Thm. 3.5), 138	Corresponding Angles Converse
	Isosceles Trapezoid Base Angles	( <b>Thm. 3.5</b> ), 138
Construction(s)	Converse (Thm. 7.15), 399	constructing parallel lines, 139
bisecting a segment, 21	Parallelogram Diagonals Converse	<b>Corresponding Angles Theorem</b>
bisecting an angle, 42	(Thm. 7.10), 378	( <b>Thm. 3.1</b> ), 132
centroid of triangle, 320	Parallelogram Opposite Angles	exploring converses, 137
circumscribing circle about triangle,	Converse (Thm. 7.8), 376	Corresponding lengths, in similar
312	Parallelogram Opposite Sides	polygons, 419
copying a segment, 13	Converse (Thm. 7.7), 376	Corresponding part(s)
copying a triangle	Perpendicular Chord Bisector	defined, in congruent polygons,
using ASA, 272	Converse (Thm. 10.8), 546	240–241
using SAS, 248	Convex polygons, 30	of similar polygons, 418
using SSS, 264	Coordinate (of point), 12	Corresponding sides, in congruent
copying an angle, 40	Coordinate plane	polygons, 240–241
defined, 13	circles in, 575–578, 586	Cosine ratio, 493–497, 520–521
of a dilation, 210	classifying triangle in, 233	of 45° and 30° angles, 496
of equilateral triangle, 254	dilating figures in, 207, 209	of complementary angles, 494
inscribing circle within triangle, 314	midsegments in, 330	defined, 494
parallel lines, 139	parallelograms in, 371, 380, 392	finding leg lengths, 495
perpendicular bisector, 149	perimeter and area in, 29-33, 57	inverse, 502
perpendicular line, 149	placing figures in, 284	Counterclockwise rotation, 190
point along directed line segment,	reflecting figures in, 181	Counterexample, 77
447	rotating figures in, 189, 191	Cross section(s), 619
proving, 280	translating a figure in, 175	<b>Cube</b> , 617
square inscribed in circle, 557	trapezoid in, 398	Customary units of length, 2
tangent to circle, 533	trapezoid midsegment, 400	<b>Cylinders,</b> volume, 625–627, 629–630,
Contingency table, 684	Coordinate proof(s), 283–286, 294	658
Contradiction, Proof by, 336	applying variable coordinates, 285	
Contradiction, Froot by, 550 Contrapositive	defined, 284	D
defined, of conditional statement, 67	placing figure in coordinate plane,	Deductive reasoning 75 70 116
	284	Deductive reasoning, 75–79, 116
truth table for, 70	writing, 283, 284, 286	compared to inductive reasoning, 78,
Contrapositive of the Triangle	Coordinate Rule for Dilations, 209	79
Proportionality Theorem,	Coordinate Rules for Reflections, 183	defined, 78
447	<b>Coordinate Rules for Rotations</b>	using correct logic, 64
Converse	about the Origin, 191	using with laws of logic, 78
defined, of conditional statement, 67	Coplanar circles, 528, 531	Defined terms of geometry, 5
truth table for, 70	Coplanar points, 4	Definitions
Converses of theorems	Corollaries	and biconditional statements, 230
Alternate Exterior Angles Converse	Congruent Parts of Parallel Lines	writing as conditional statement, 68
(Thm. 3.7), 139	Corollary, 374	Degrees
Alternate Interior Angles Converse	Corollary to the Base Angles	converting between radians and, 597

Theorem (Cor. 5.2), 253

measure of angle, 39

(Thm. 3.6), 139

Density, 628	E	Flowchart proof
<b>Dependent events,</b> 675–678, 714		concept summary of, 110
comparing to independent events,	Edge (of polyhedron), 617, 618	defined, 106
678	Endpoints, 5	matching reasons in, 105
defined, 675, 677	Enlargement, 208	Focus, of parabola, 721–725
determination of, 675	Equations	defined, 722
probability of, 677–678	of circles, writing and graphing,	Formulas
Diagonal of polygon, 360	576–577	arc length, 595
Diagrams	of lines, writing, 123	circle
identifying postulates from, 85	of perpendicular line, 299	area of, 601–602
interpreting, 51, 83	solving with variables on both sides,	circumference of, 594
sketching and interpreting, 86	229	combinations, 702
using for congruent triangles, 265	writing for perpendicular bisectors,	cone
Diameter	305	surface area of, 642
chord perpendicular to, 545, 547	Equations of parallel and	volume of, 643
defined, 530	perpendicular lines,	cylinder, volume, 627
of sphere, 648, 649	155–159, 166	density, 628
Die roll, 668	distance from point to line, 159	Distance Formula, 23
<b>Dilation(s),</b> 207–211, 224	identifying lines, 157	kite area, 610
comparing triangles after, 417	partitioning a directed line segment,	Midpoint Formula, 22
constructing, 210	156	permutations, 701
coordinate rule for, 209	writing, 155, 158, 166	population density, 603
defined, 208	Equiangular polygon, 361	prism, volume, 626
finding perimeter and area after, 416	Equiangular triangle, classifying, 232	pyramid, volume, 636
identifying, 208	Equidistant (point), 302	Pythagorean Theorem (Thm. 9.1),
negative scale factor, 210	Equidistant Chords Theorem	464
performing, in coordinate plane,	(Thm. 10.9), 548	regular polygon, area, 612
207, 209	Equilateral polygon, 361	rhombus area, 610
scale factor, 208, 415	Equilateral triangle	sectors, area, 601, 604-605
Directed line segment	classifying, 232	sphere
constructing point along, 447	constructing, 254	surface area of, 648
defined, 156	using, 254–255	volume of, 650
Directrix, of parabola, 722	Equivalent statements, 67	spherical cap, volume, 654
Disjoint events, 694, 715	Event(s)	Frequency(ies)
Distance (between points)	compound, 694–695	probability and two-way tables,
defined, 12	defined, 668	684–686
finding minimum distance, 185	probability of complement of,	Fundamental Counting Principle,
using circumference and arc length	669–670	700
to find, 596	Experimental probability, 671, 675	
Distance Formula, 23	Exterior Angle Inequality Theorem,	G
using, 229	342	Geometric mean
Distance from a point to a line	Exterior angle measures of polygons,	compared to arithmetic mean, 477,
defined, 148	362–363	484
finding, 159	Exterior Angle Theorem (Thm. 5.2),	defined, 477, 480
Distributive Property, 93	234	
_ · · · · · · · · · · · · · · · · · · ·	Exterior angles, 233	using, 480–481
Division Property of Equality, 92 Dodecagon, 363	Exterior of the angle, 38	Geometric Mean (Altitude) Theorem
	External segment, 571	(Thm. 9.7), 480
Dodecahedron, 617	External Tangent Congruence	Geometric Mean (Leg) Theorem
Dynamic geometry software	<b>Theorem (Thm. 10.2),</b> 532	(Thm. 9.8), 480
basic drawings of lines, segments,	111corem (11111. 10.2), 332	Geometric probability, 670
and rays, 3		Geometric relationships, proving,
calculating sine and cosine ratios,	T (6 11 1 ) (17 (10	105–110, 118
493	Faces (of polyhedron), 617, 618	Glider reflection(s), 184
constructing chords, 545	Factorial numbers, n, 700	Golden ratio, 426
drawing perpendicular bisector, 300	Favorable outcomes, 669	Graph theory, 276
drawing triangles, 245	Flawed reasoning, 64	Graphing calculator
side lengths and angle measures, 172	Flow proof, 106	combinations, 702

normalitations 701	Insarihad angle(s)	Isoggados triongle(s) 251 255 201
permutations, 701 <b>Graphing a circle</b> , 577	Inscribed angle(s) defined, 553, 554	<b>Isosceles triangle(s),</b> 251–255, 291, <i>See also</i> Isosceles right
Great circle, 648	finding measure of angle, 555	triangle
· —	finding measure of intercepted arc,	classifying, 232
H	555	median and altitude of, 323
	Inscribed Angles of a Circle Theorem	using, 254–255
Heads and tails, 668	(Thm. 10.11), 555	using Base Angles Theorem,
Hinge Theorem (Thm. 6.12), 344	Inscribed polygon(s)	252–253
converse of, 344 using, 345	constructing square inscribed in	writing conjecture about, 251
Histograms	circle, 557	
analyzing, 707	defined, 553, 556	
making, 665	Inscribed Quadrilateral Theorem	Joint frequency, 684
Horizontal component, 174	(Thm. 10.13), 556	Joint relative frequency, 685
Horizontal lines, 157	Inscribed Right Triangle Theorem	
Horizontal stretch, and nonrigid	(Thm. 10.12), 556	K
transformation, 211	Intercepted arc, 553, 554	Kite(s)
Hypotenuse (of right triangle), 264	Interior angle measures of polygons,	area of, 610
Hypotenuse-Leg (HL)	360–362	defined, 401
Congruence Theorem	finding unknown interior angle	finding angle measures in, 401, 410
( <b>Thm. 5.9</b> ), 264–265, 273	measure, 361	Kite Diagonals Theorem (Thm. 7.18),
Hypothesis, in conditional statement,	number of sides of polygon, 361	401
66	sum of angle measures, 360	Kite Opposite Angles Theorem
	Interior angles, 233	( <b>Thm. 7.19</b> ), 401
	Interior of the angle, 38	
Icosahedron, 617	Intersecting lines	L
<b>If-then form,</b> of conditional statement,	and circles, 562	Lateral surface of cone, 642
66	example of, 124, 125	<b>Law of Cosines,</b> 507–508, 511–512,
Image, 174	reflections, 203	522
Incenter of triangle	Intersection	defined, 511
defined, 313	defined, 6	solving triangles
examples of segments and points in	of events, 694–695	with SAS case, 511
triangles, 323	of lines and planes, 3, 6	with SSS case, 512
inscribing circle within triangle, 314	Inverse	Law of Cosines (Thm. 9.10), 511
using, 313	defined, of conditional statement, 67	Law of Detachment, 78 Law of Sines, 507–510, 522
Incenter Theorem (Thm. 6.6), 313	truth table for, 70	ambiguous case of, 515
Independent events, 675–678, 714	Inverse cosine, 502	areas of triangles, 508
comparing to dependent events, 678	Inverse of the Triangle Proportionality	defined, 509
defined, 675–676	Theorem, 447	solving triangles
determination of, 675–676	Inverse operations, 92	with AAS case, 510
probability of, 676–677	Inverse sine, 502	with ASA case, 510
Indirect measurement	Inverse tangent, 502	with SSA case, 509
of river, 277, 279	Inverse trigonometric ratios, 502	Law of Sines (Thm. 9.9), 509
using geometric mean of right	Isometry, 176	Law of Syllogism, 78
triangle, 481	Isomorphic polygons, 276	Laws of Logic, 78 Legs
Indirect proof defined, 336	Isosceles right triangle	of isosceles triangle, 252
	side lengths, 471, 472	of right triangle
used in Triangle Larger Angle Theorem (Thm. 6.10), 337	in standard position, 462	defined, 264
writing, 336, 352	Isosceles trapezoid	finding, with sine and cosine
Indirect reasoning, 336	defined, 398	ratios, 495
Inductive reasoning, 75–79, 116	using properties of, 399	finding, with tangent ratio, 489
compared to deductive reasoning,	Isosceles Trapezoid Base Angles	of trapezoid, 398
78, 79	Converse (Thm. 7.15), 399	<b>Likelihoods,</b> and probabilities, 666,
defined, 76	Isosceles Trapezoid Base Angles	668
using with conjecture, 76–77	<b>Theorem (Thm. 7.14),</b> 399	Line(s) in coordinate plane, characteristics
Inferring the truth, 64	Isosceles Trapezoid Diagonals	of, 124
<b>Initial point,</b> of vector, 174	<b>Theorem (Thm. 7.16),</b> 399	intersecting in circles, 562
		~

Midpoint(s), 19–23, 57 Obtuse triangle intersections with planes, 3 Line Intersection Postulate defined, 20 in circumscribed circle, 311 (Post. 2.3), 84 Distance Formula, 23 classifying by angles, 232 Line-Point Postulate (Post. 2.2), 84 of line segment, finding, 19 classifying by Pythagorean Plane Intersection Postulate Midpoint Formula, 22 inequalities, 467 (Post. 2.7), 84 and segment bisectors, 20-21 orthocenter of, 322 Plane-Line Postulate (Post. 2.6), 84 Midpoint Formula, 22 Octahedron, 617 that intersect circles, 529-533, 582 using, 229 Opposite of statement, See Negation, Two Point Postulate (Post. 2.1), 84 Midsegment of a trapezoid, 400 of Conditional Statement undefined term, and naming, 4 Midsegment of a triangle, 329–332, Opposite rays, 5 writing equations of, 123 351 **Opposite Sides Parallel and Line Intersection Postulate** defined, 330 **Congruent Theorem** (Post. 2.3), 84 examples of segments in triangles, (Thm. 7.9), 378 Line of reflection, 182 "or" (union), 694–695 Line of symmetry, 185 using in coordinate plane, 330 Orthocenter of triangle Line perpendicular to plane, 86 using Triangle Midsegment defined, 321 Line-Point Postulate (Post. 2.2), 84 Theorem (Thm. 6.8), 331–332 examples of segments and points in Line segment(s), See also Segment(s) Midsegment triangle, 330 triangles, 323 defined, 5 Minor arc, 537, 538 finding, 322 directed, partitioning, 156 Modeling with Mathematics, type of triangle, and location, 322 Line symmetry, 185 *Throughout. See for example:* Outcomes Linear pair (of angles), 50 basics of geometry defined, 668 **Linear Pair Perpendicular Theorem** area of shed floor, 33 favorable, 669 (Thm. 3.10), 150 planes in sulfur hexafluoride, 7 Overlapping events Linear Pair Postulate (Post. 2.8), circles, northern lights, 565 defined, 694 108, 133 congruent triangles, angle measures, finding probability of, 695, 715 Lines, pairs of 235 classifying, 124, 125 probabilities and likelihoods, 666 identifying parallel and reasoning and proofs, city street, 95 Pairs of angles, See Angle(s), pairs of perpendicular lines, 126–127 right triangles and trigonometry Pairs of lines, See Lines, pairs of Lines Perpendicular to a Transversal angle of elevation and height of Parabola(s) **Theorem (Thm. 3.12),** 150 tree, 490 directrix, 722-724 Literal equations, rewriting, 63 equilateral triangle road sign, 474 Distance Formula to write equation Logic, deductive reasoning and flawed similarity, swimming pool, 420 of, 722 reasoning, 64 three-dimensional figures, equation of translation of, 725 Logically equivalent statements, 70 rectangular chest, 629 focus of, 721-725 transformations, golf website, 177 latus rectum, 728 triangles, neighborhood distances, satellite dishes and spotlights, 721 Major arc, 538 standard equations of, 723-724 **Multiplication Property of Equality, Making Sense of Problems** Parabolic reflectors, 725 92 circumcenter on right triangle, 312 Paragraph proof inductive reasoning and deductive concept summary of, 110 Mutually exclusive events, 694 reasoning, 79 defined, 108 Marginal frequency, 684 Parallel and perpendicular lines, 122 Marginal relative frequency, 685 equations of, 155-159, 166 Measure of a major arc, 538 n factorial, 700 identifying, 357 *n***-gon**, 30 Measure of a minor arc, 538 pairs of lines and angles, 125–128, Negation, of conditional statement, 66 Measure of an angle, 39 Negative scale factor, 210 Measure of an Inscribed Angle parallel lines and transversals, Nets for three-dimensional solids, 592 Theorem (Thm. 10.10), 554 131-134, 164 Nonrigid transformation, 211 Measurement, indirect, 277, 279 proofs with parallel lines, 137–141, nth term, of arithmetic sequence, 63 Median of trapezoid, 400 Median of triangle, 319–321, 323, 351 proofs with perpendicular lines, defined, 320 147-151, 165 Obtuse angle examples of segments and points in **Parallel lines** defined, 39 triangles, 300, 323 constructing, 139 trigonometric ratios for, 508 Metric units of length, 2 defined, and identifying, 126-127

example of, 124, 125	<b>Percent,</b> finding, 665	Perpendicular Postulate (Post. 3.2),
identifying, slopes of, 157	Performance Tasks	127
proofs with, 137–141, 165	Bicycle Renting Stations, 349	Perpendicular Transversal Theorem
constructing parallel lines, 139	Circular Motion, 581	( <b>Thm. 3.11</b> ), 150
Corresponding Angles Converse	Comfortable Horse Stalls, 55	Plane(s), See also Parallel planes
(Thm. 3.5), 138	Creating the Logo, 289	intersections with lines, 3
proving Alternate Interior Angles	Induction and the Next Dimension,	Plane Intersection Postulate
Converse, 140	115	(Post. 2.7), 84
Transitive Property of Parallel	Judging the Math Fair, 453	Plane-Line Postulate (Post. 2.6), 84
Lines (Thm. 3.9), 141	The Magic of Optics, 221	Plane-Point Postulate (Post. 2.5), 84
properties of, 132–134	Navajo Rugs, 163	Three Point Postulate (Post. 2.4), 84
Alternate Exterior Angles	A New Dart Board, 713	undefined term, and naming, 4
Theorem (Thm. 3.3), 132	Scissor Lifts, 407	Plane Intersection Postulate
Alternate Interior Angles	Triathlon, 517	( <b>Post. 2.7</b> ), 84
Theorem (Thm. 3.2), 132	Water Park Renovation, 655	Plane-Line Postulate (Post. 2.6), 84
Consecutive Interior Angles	Perimeter	Plane-Point Postulate (Post. 2.5), 84
Theorem (Thm. 3.4), 132	in coordinate plane, 29–33, 57	Platonic solids, 617
Corresponding Angles Theorem	finding, 31	Point(s)
(Thm. 3.1), 132	finding after dilation, 416	Line Intersection Postulate
proportionality with three lines, 448	of similar polygons, 420	(Post. 2.3), 84
proving theorems about, 140	of triangle, square, and rectangle, 31	Line-Point Postulate (Post. 2.2), 84
Reflections in Parallel Lines	Perimeters of Similar Polygons	Plane-Line Postulate (Post. 2.6), 84
Theorem (Thm. 4.2), 202	( <b>Thm. 8.1</b> ), 420	Plane-Point Postulate (Post. 2.5), 84
and transversals, 131–134, 164	<b>Permutation(s),</b> 699–701, 716	Three Point Postulate (Post. 2.4), 84
writing equations of, 155, 158, 166	counting, 700	Two Point Postulate (Post. 2.1), 84
Parallel planes, 126	defined, 700	undefined term, and naming, 4
Parallel Postulate (Post. 3.1), 127	finding probability using, 701	Point of concurrency
Parallelogram(s)	formulas, 701	defined, 310
in coordinate plane, 371, 380, 392	Perpendicular bisector(s)	examples of segments and points in
defined, 368	constructing, 149	triangles, 323
diagonal lengths of, 378	drawing, 300	Point of tangency, 530
identifying and verifying, 376–379	examples of segments and points in	Polar coordinate system, 196
properties of, 367–370, 408	triangles, 300, 323	Polygon(s)
properties of diagonals, 390–391	points on, 301	angle measures in, 611
properties of special parallelograms,	using, 302–303	angles of, 359–363, 408
387–392, 409–410	using chords of circles, 546–547	exterior angle measures of,
side lengths of, 377	writing equations for, 305	362–363
ways to prove quadrilateral is	Perpendicular Bisector Theorem	interior angle measures of,
parallelogram, 379	(Thm. 6.1), 302	360–362
writing two-column proof, 370	converse of, 302	area of, 29, 609–613, 657
Parallelogram Consecutive Angles	Perpendicular Chord Bisector	classifying types of, 30, 31, 361
<b>Theorem (Thm. 7.5),</b> 369	Converse (Thm. 10.8), 546	congruent, 239–242, 290
Parallelogram Diagonals Converse	Perpendicular Chord Bisector	using corresponding parts,
( <b>Thm. 7.10</b> ), 378	<b>Theorem (Thm. 10.7),</b> 546	240–241
Parallelogram Diagonals Theorem	Perpendicular lines	using Third Angles Theorem
( <b>Thm. 7.6</b> ), 369	defined, 68	(Thm. 5.4), 242
Parallelogram Opposite Angles	equation of, 299	convex compared to concave, 30
Converse (Thm. 7.8), 376	example of, 124	drawing regular, 37
Parallelogram Opposite Angles	identifying, 127	inscribed, 553, 556–557, 584
<b>Theorem (Thm. 7.4),</b> 368	slopes of, 157	similar, 417–422 ( <i>See also</i> Similar
Parallelogram Opposite Sides	proofs with, 147–151, 165	polygons)
Converse (Thm. 7.7), 376	constructing perpendicular lines,	Polygon Exterior Angles Theorem
Parallelogram Opposite Sides	149	(Thm. 7.2), 362
<b>Theorem (Thm. 7.3),</b> 368	distance from point to line, 148	Polygon Interior Angles Theorem
Partitioning a directed line segment,	proving theorems about	(Thm. 7.1), 360
156	perpendicular lines, 150	<b>Polyhedron,</b> 617, 618
Patterns, in dilation, 416	writing equations of, 155, 158, 166	Population density, 603

Postulate, defined, 12	of complements of events, 669–670	paragraph proof, 108, 110
Postulates	conditional (See Conditional	two-column proofs, 100, 102,
Angle Addition Postulate (Post. 1.4),	probability)	110
41	disjoint and overlapping events,	using properties of congruence,
Arc Addition Postulate (Post. 10.1),	693–696, 715	101
539	experimental, 671, 675	types of, 110
Line Intersection Postulate	frequencies, 684–686	writing coordinate proofs involving
(Post. 2.3), 84	geometric, 670	circles, 578
Line-Point Postulate (Post. 2.2), 84	independent and dependent events,	<b>Proof by Contradiction, 336</b>
Linear Pair Postulate (Post. 2.8), 108	675–679, 714	Proofs of theorems
Parallel Postulate (Post. 3.1), 127	permutations and combinations,	Angle-Angle-Side (AAS)
Perpendicular Postulate (Post. 3.2),	699–703, 716	Congruence Theorem
127	sample spaces, 667–671, 714	(Thm. 5.11), 271
Plane Intersection Postulate	theoretical, 668–670	Angle-Angle (AA) Similarity
(Post. 2.7), 84	two-way tables, 683–687, 715	Theorem (Thm. 8.3), 428
Plane-Line Postulate (Post. 2.6), 84	Probability distribution(s)	Angle-Side-Angle (ASA)
Plane-Point Postulate (Post. 2.5), 84	constructing, 708	Congruence Theorem
Protractor Postulate (Post. 1.3), 39	defined, 708	(Thm. 5.10), 270
Reflection Postulate (Post. 4.2), 184	interpreting, 709	Base Angles Theorem (Thm. 5.6),
Rotation Postulate (Post. 4.3), 192	Probability experiment, 668	252
Ruler Postulate (Post. 1.1), 12	Probability of an event	Circumcenter Theorem (Thm. 6.5),
Segment Addition Postulate	defined, 668	310
(Post. 1.2), 14–15	and likelihoods, 666, 668	Converse of the Hinge Theorem
Three Point Postulate (Post. 2.4), 84	Probability of complement of event,	(Thm. 6.13), 345
Translation Postulate (Post. 4.1),	669–670	Kite Diagonals Theorem
176	Probability of compound events,	(Thm. 7.18), 401
Two Point Postulate (Post. 2.1), 84	694–695	Parallelogram Diagonals Theorem
Volume Addition Postulate, 633	Probability of dependent events,	(Thm. 7.6), 370
Postulates and diagrams, 83–86, 117	677–678	Parallelogram Opposite Sides
diagrams, sketching and	Probability of independent events,	Converse (Thm. 7.7), 376
interpreting, 83, 86	676–677	Parallelogram Opposite Sides
identifying postulates from a diagram, 85	Proof(s), See also Reasoning and	Theorem (Thm. 7.3), 368
Line Intersection Postulate	proofs	Perpendicular Bisector Theorem
(Post. 2.3), 84	with congruent triangles, that	(Thm. 6.1), 302
Line-Point Postulate (Post. 2.2), 84	triangles are congruent, 242	Perpendicular Transversal Theorem
Plane Intersection Postulate	constructions, 280	(Thm. 3.11), 150
(Post. 2.7), 84	defined, 100	Rhombus Diagonals Theorem
Plane-Line Postulate (Post. 2.6), 84	with parallel lines, 137–141, 165	(Thm. 7.11), 390
Plane-Point Postulate (Post. 2.5), 84	constructing parallel lines, 139	Side-Angle-Side (SAS) Congruence
Three Point Postulate (Post. 2.4), 84	Corresponding Angles Converse	Theorem (Thm. 5.5), 246
Two Point Postulate (Post. 2.1), 84	(Thm. 3.5), 138 proving Alternate Interior Angles	Side-Side-Side (SSS) Congruence
Precision, Attending to	Converse (Thm. 3.6), 140	Theorem (Thm. 5.8), 262
exactly two answers, 669	proving theorems about parallel	Side-Side-Side (SSS) Similarity
probabilities, 710	lines, 134	Theorem (Thm. 8.4), 437
rounding trigonometric ratios and	Transitive Property of Parallel	Similar Circles Theorem
lengths, 488	Lines (Thm. 3.9), 141	(Thm. 10.5), 541
standard position for right triangle,	with perpendicular lines, 147–151,	Slopes of Parallel Lines (Thm. 3.13)
462	165	439
on statement of problem, 314	constructing perpendicular lines,	Slopes of Perpendicular Lines
use $\pi$ key on calculator, 594	149	(Thm. 3.14), 440
Preimage, 174	distance from point to line, 148	Symmetric Property of Angle
Prime notation, 174	proving theorems about perpen-	Congruence, 102, 110
<b>Prisms,</b> volume, 625–627, 629–630,	dicular lines, 150	Symmetric Property of Segment
658	proving statements about segments	Congruence, 101
Probability, 664	and angles, 99–102, 118	Triangle Larger Angle Theorem
binomial distributions, 707–710, 716	flowchart proof, 106, 110	(Thm. 6.10), 337

Triangle Midsegment Theorem	with inscribed angles, 553	congruent segments, 13
(Thm. 6.8), 331	Quadrilaterals and other polygons,	rely on marked information, 402
Triangle Sum Theorem (Thm. 5.1),	356	right angle and right triangle, 23
234	angles of polygons, 359–363, 408	Real-life problems, Throughout. See
Properties	properties of parallelograms,	for example:
Addition Property of Equality, 92	367–371, 408	basics of geometry
Algebraic Properties of Equality, 92	properties of special parallelograms,	angles in ball-return net, 49
of congruence, 101–102	387–392, 409–410	planes in sulfur hexafluoride, 7
Distributive Property, 93	properties of trapezoids and kites,	circles, graphs of, earthquake and
Division Property of Equality, 92	397–402, 410	seismograph, 578
Multiplication Property of Equality, 92	proving quadrilateral is a parallelogram, 375–380, 409	circumference and distance traveled, 596
of parallel lines, 132–134	R	congruent triangles
Reflexive Property, 94		bench with diagonal support, 263
Substitution Property of Equality, 92	Radians, measuring angles in, 597	sign on barn, 248
Subtraction Property of Equality, 92	Radicals, using properties of, 461	parallel and perpendicular lines
Symmetric Property, 94	Radius	in neighborhood layout, 151 sunlight angles, 134
Transitive Property, 94	of arc, 40	probability
Properties of Angle Congruence	of circle	adults with pets, 671
( <b>Thm. 2.2</b> ), 101	defined, 530	diagnostic test for diabetes, 696
Properties of Segment Congruence	finding with congruent chords,	reasoning and proofs, percent raise,
(Thm. 2.1), 101	548	93
Properties of Triangle Congruence	finding with segments, 572	relationships within triangles
(Thm. 5.3), 241	of regular polygon, 611	biking, 346
Proportionality, 445–449, 456	of sphere, 648	bridge, 303
finding relationships, 445	Random variable, 708	circumcenter or incenter for
ratios forming, 415 of three parallel lines, 448	<b>Ratios,</b> forming a proportionality, 415	lamppost placement, 314
with triangle angle bisector, 449	Ray(s), and naming, 5	distance in city, 311
of triangles, 446–447	Reading	soccer goal, 305
Proportions, solving	abbreviations: sin, cos, hyp., 494	right triangles and trigonometry
Protractor Postulate (Post. 1.3), 39	abbreviations: tan, opp., adj., 488	angle of depression and skiing on
Pyramids	approximately equal to, 23 biconditionals, 390	mountain, 497
frustum of, 640	bisect, 20	angle of elevation and height of
net for, 592	bisector of circle arc, 546	tree, 490
volumes of, 635–638, 659	circles, radius and diameter, 530	equilateral triangle road sign, 474
<b>Pythagorean Inequalities Theorem</b>	circum- prefix, 311	roof height, 479
( <b>Thm. 9.3</b> ), 467	compound inequality, 339	skyscrapers and support beams,
Pythagorean Theorem (Thm. 9.1),	contradiction, 336	465
463–467, 518	corresponding lengths, 419	solving right triangles and raked
classifying triangles as acute or	dilation scale factor, 208	stage, 504
obtuse, 467	inverse tangent, 502	step angle of dinosaurs, 512 similarity
in Distance Formula, 23	negative reciprocals, 157	height of flagpole, 430
proving without words, 463	parallelogram notation, 201	triangles and shoe rack, 447
using, 464–465	raked stage, 504	three-dimensional figures,
using converse of, 466	scale factors, 211	rectangular dresser, 629
Pythagorean Theorem (Thm. 9.1),	statement of proportionality, 418	transformations
464	trapezoid midsegment, 400	finding minimum distance, 185
Pythagorean triple, 464	triangle altitudes, 322	golf website, 177
0	triangle area formula, 321	scale factor and length of image,
	triangle classifications, 232	211
Quadratic equations, solving by	triangle notation, 31	Reasoning and proofs, 62
completing the square, 527	two-way table, 684	algebraic reasoning, 91–95
Quadrilateral	Reading Diagrams	conditional statements, 65–70, 116
area of, 29	center of circle circumscribed about	inductive and deductive reasoning,
classifications of, 358, 389, 402	polygon, 612	75–79, 116
identifying special, 402	congruent angles, 40	postulates and diagrams, 83–86, 117

proving geometric relationships,	Fundamental Counting Principle,	sine ratio, 493–497, 520–521
105–110, 118	700	solving right triangles, 501–504, 521
proving statements about segments	inverse operations, 92	special right triangles, 471–474, 518
and angles, 99–102, 118	order of operations, 93	tangent ratio, 487–490, 520
Reasoning, visual, of similar triangles,	perimeter and area in coordinate	Rigid motion
429	plane, 31	defined, 176
Rectangle	perpendicular lines, 126	using in congruent polygons,
defined, 388	polygon in coordinate plane, 371	239–240
diagonal lengths in, 391	radical in simplest form, 472	Rotation(s), 189–193, 223
perimeter and area, 31	slope-intercept form, 158	in coordinate plane, 189, 191
Rectangle Corollary (Cor. 7.3), 388	slope of line, 156	coordinate rules for rotations about
Rectangle Diagonals Theorem	slopes, product of, 183	the origin, 191
( <b>Thm. 7.13</b> ), 391	system of linear equations in two	defined, 190
Reduction, 208	variables, 159	direction, clockwise or counterclockwise, 190
<b>Reflection(s)</b> , 181–185, 222	Triangle Inequality Theorem	performing, 190–191
coordinate rules for, 183	(Thm. 6.11), 467	performing compositions with, 192
defined, 182	triangle side lengths, 473	Rotation Postulate (Post. 4.3), 192
glide reflections, 184	<b>Revolution</b> , solids of, 620	Rotational symmetry, 193
in horizontal and vertical lines, 182	Rhombus	Ruler Postulate (Post. 1.1), 12
in line $y = x$ or $y = -x$ , 183	angle measures in, 390	Rules, proved and unproved, 12
performing, 182–183	area of, 610	rates, proved and amproved, 12
triangle in coordinate plane, 181	defined, 388	S
triangle using reflective device, 181	Rhombus Corollary (Cor. 7.2), 388	Same-Side Interior Angles Theorem,
Reflection Postulate (Post. 4.2), 184	Rhombus Diagonals Theorem	See Consecutive Interior
Reflections in Intersecting Lines	( <b>Thm. 7.11</b> ), 390	Angles Theorem (Thm. 3.4)
<b>Theorem (Thm. 4.3),</b> 203	Rhombus Opposite Angles Theorem	Sample space, 667–671, 714
<b>Reflections in Parallel Lines Theorem</b>	( <b>Thm. 7.12</b> ), 390	defined, 668
( <b>Thm. 4.2</b> ), 202	Right angle, 39	finding, 667–668
<b>D</b> 0 1 0 1	Dight Angles Congruence Theorem	mang, 007–000
Reflexive Property, 94	Right Angles Congruence Theorem	SAS See Side-Angle-Side (SAS)
triangle congruence, 241	( <b>Thm. 2.3</b> ), 106	SAS, See Side-Angle-Side (SAS) Scale factor
triangle congruence, 241 <b>Regular polygon</b>	(Thm. 2.3), 106 Right cone, 642	Scale factor
triangle congruence, 241 <b>Regular polygon</b> angle measures in, 611	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem	Scale factor defined, 208
triangle congruence, 241 <b>Regular polygon</b> angle measures in, 611 areas of, 609–610, 612–613, 657	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478	Scale factor defined, 208 of dilation, 415
triangle congruence, 241 <b>Regular polygon</b> angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles	Scale factor defined, 208 of dilation, 415 negative, 210
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles in circumscribed circle, 311	Scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles in circumscribed circle, 311 classifying, 232	Scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322	Scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519	Scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232 Secant, 530
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479	Scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481	Scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232 Secant, 530 Secant segment, 571–572
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521	Scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232 Secant, 530 Secant segment, 571–572 Sector of circle
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles,	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric	Scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232 Secant, 530 Secant segment, 571–572 Sector of circle area of, 601, 604–605, 656
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502	Scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232 Secant, 530 Secant segment, 571–572 Sector of circle area of, 601, 604–605, 656 defined, 604
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles,	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of	Scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232 Secant, 530 Secant segment, 571–572 Sector of circle area of, 601, 604–605, 656 defined, 604 Segment(s)
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles, 319–323, 351	(Thm. 2.3), 106 Right cone, 642 Right Triangle Similarity Theorem (Thm. 9.6), 478 Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of 30°-60°-90° triangle, 471, 473	scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232 Secant, 530 Secant segment, 571–572 Sector of circle area of, 601, 604–605, 656 defined, 604 Segment(s) construction, bisecting a segment,
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles, 319–323, 351 perpendicular and angle bisectors,	(Thm. 2.3), 106  Right cone, 642  Right Triangle Similarity Theorem (Thm. 9.6), 478  Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of 30°-60°-90° triangle, 471, 473 isosceles (45°-45°-90°), 471, 472	scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232 Secant, 530 Secant segment, 571–572 Sector of circle area of, 601, 604–605, 656 defined, 604 Segment(s) construction, bisecting a segment, 21
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67 Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles, 319–323, 351 perpendicular and angle bisectors, 301–305, 350	(Thm. 2.3), 106  Right cone, 642  Right Triangle Similarity Theorem (Thm. 9.6), 478  Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of 30°-60°-90° triangle, 471, 473 isosceles (45°-45°-90°), 471, 472 standard position for, 462	Scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232 Secant, 530 Secant segment, 571–572 Sector of circle area of, 601, 604–605, 656 defined, 604 Segment(s) construction, bisecting a segment, 21 defined, and naming, 5 finding length of, 19, 20 finding midpoint of, 19
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles, 319–323, 351 perpendicular and angle bisectors, 301–305, 350 triangle midsegments, 329–332, 351	(Thm. 2.3), 106  Right cone, 642  Right Triangle Similarity Theorem (Thm. 9.6), 478  Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of 30°-60°-90° triangle, 471, 473 isosceles (45°-45°-90°), 471, 472 standard position for, 462  Right triangles and trigonometry,	scale factor defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232 Secant, 530 Secant segment, 571–572 Sector of circle area of, 601, 604–605, 656 defined, 604 Segment(s) construction, bisecting a segment, 21 defined, and naming, 5 finding length of, 19, 20 finding midpoint of, 19 length in proportional triangles, 446
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles, 319–323, 351 perpendicular and angle bisectors, 301–305, 350 triangle midsegments, 329–332, 351  Relative frequencies, finding,	(Thm. 2.3), 106  Right cone, 642  Right Triangle Similarity Theorem (Thm. 9.6), 478  Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of 30°-60°-90° triangle, 471, 473 isosceles (45°-45°-90°), 471, 472 standard position for, 462  Right triangles and trigonometry, 460	scale factor  defined, 208  of dilation, 415  negative, 210  of similar solids, 630  units in, and finding, 211  Scalene triangle, classifying, 232  Secant, 530  Secant segment, 571–572  Sector of circle  area of, 601, 604–605, 656  defined, 604  Segment(s)  construction, bisecting a segment,  21  defined, and naming, 5  finding length of, 19, 20  finding midpoint of, 19  length in proportional triangles, 446  measuring and constructing, 11–15,
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles, 319–323, 351 perpendicular and angle bisectors, 301–305, 350 triangle midsegments, 329–332, 351  Relative frequencies, finding, conditional, 685–686	(Thm. 2.3), 106  Right cone, 642  Right Triangle Similarity Theorem (Thm. 9.6), 478  Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of 30°-60°-90° triangle, 471, 473 isosceles (45°-45°-90°), 471, 472 standard position for, 462  Right triangles and trigonometry, 460 cosine ratio, 493–497, 520–521	scale factor  defined, 208  of dilation, 415  negative, 210  of similar solids, 630  units in, and finding, 211  Scalene triangle, classifying, 232  Secant, 530  Secant segment, 571–572  Sector of circle  area of, 601, 604–605, 656  defined, 604  Segment(s)  construction, bisecting a segment, 21  defined, and naming, 5  finding length of, 19, 20  finding midpoint of, 19  length in proportional triangles, 446  measuring and constructing, 11–15, 56
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles, 319–323, 351 perpendicular and angle bisectors, 301–305, 350 triangle midsegments, 329–332, 351  Relative frequencies, finding, conditional, 685–686 joint and marginal, 685–686	(Thm. 2.3), 106  Right cone, 642  Right Triangle Similarity Theorem (Thm. 9.6), 478  Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of 30°-60°-90° triangle, 471, 473 isosceles (45°-45°-90°), 471, 472 standard position for, 462  Right triangles and trigonometry, 460 cosine ratio, 493–497, 520–521 Law of Cosines, 507–508, 511–512,	scale factor  defined, 208  of dilation, 415  negative, 210  of similar solids, 630  units in, and finding, 211  Scalene triangle, classifying, 232  Secant, 530  Secant segment, 571–572  Sector of circle  area of, 601, 604–605, 656  defined, 604  Segment(s)  construction, bisecting a segment, 21  defined, and naming, 5  finding length of, 19, 20  finding midpoint of, 19  length in proportional triangles, 446  measuring and constructing, 11–15, 56  congruent segments, 13
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67 Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles, 319–323, 351 perpendicular and angle bisectors, 301–305, 350 triangle midsegments, 329–332, 351  Relative frequencies, finding, conditional, 685–686 joint and marginal, 685–686 Remember	(Thm. 2.3), 106  Right cone, 642  Right Triangle Similarity Theorem (Thm. 9.6), 478  Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of 30°-60°-90° triangle, 471, 473 isosceles (45°-45°-90°), 471, 472 standard position for, 462  Right triangles and trigonometry, 460 cosine ratio, 493–497, 520–521 Law of Cosines, 507–508, 511–512, 522	defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211 Scalene triangle, classifying, 232 Secant, 530 Secant segment, 571–572 Sector of circle area of, 601, 604–605, 656 defined, 604 Segment(s) construction, bisecting a segment, 21 defined, and naming, 5 finding length of, 19, 20 finding midpoint of, 19 length in proportional triangles, 446 measuring and constructing, 11–15, 56 congruent segments, 13 Ruler Postulate (Post. 1.1), 12
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles, 319–323, 351 perpendicular and angle bisectors, 301–305, 350 triangle midsegments, 329–332, 351  Relative frequencies, finding, conditional, 685–686 joint and marginal, 685–686 Remember complete the square, 577	(Thm. 2.3), 106  Right cone, 642  Right Triangle Similarity Theorem (Thm. 9.6), 478  Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of 30°-60°-90° triangle, 471, 473 isosceles (45°-45°-90°), 471, 472 standard position for, 462  Right triangles and trigonometry, 460 cosine ratio, 493–497, 520–521 Law of Cosines, 507–508, 511–512, 522 Law of Sines, 507–510, 522	scale factor  defined, 208  of dilation, 415  negative, 210  of similar solids, 630  units in, and finding, 211  Scalene triangle, classifying, 232  Secant, 530  Secant segment, 571–572  Sector of circle  area of, 601, 604–605, 656  defined, 604  Segment(s)  construction, bisecting a segment,  21  defined, and naming, 5  finding length of, 19, 20  finding midpoint of, 19  length in proportional triangles, 446  measuring and constructing, 11–15,  56  congruent segments, 13  Ruler Postulate (Post. 1.1), 12  Segment Addition Postulate
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles, 319–323, 351 perpendicular and angle bisectors, 301–305, 350 triangle midsegments, 329–332, 351  Relative frequencies, finding, conditional, 685–686 joint and marginal, 685–686 Remember complete the square, 577 convex polygon, 360	(Thm. 2.3), 106  Right cone, 642  Right Triangle Similarity Theorem (Thm. 9.6), 478  Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of 30°-60°-90° triangle, 471, 473 isosceles (45°-45°-90°), 471, 472 standard position for, 462  Right triangles and trigonometry, 460 cosine ratio, 493–497, 520–521 Law of Cosines, 507–508, 511–512, 522 Law of Sines, 507–510, 522 Pythagorean Theorem (Thm. 9.1),	scale factor  defined, 208 of dilation, 415 negative, 210 of similar solids, 630 units in, and finding, 211  Scalene triangle, classifying, 232  Secant, 530  Secant segment, 571–572  Sector of circle area of, 601, 604–605, 656 defined, 604  Segment(s) construction, bisecting a segment, 21 defined, and naming, 5 finding length of, 19, 20 finding midpoint of, 19 length in proportional triangles, 446 measuring and constructing, 11–15, 56 congruent segments, 13 Ruler Postulate (Post. 1.1), 12 Segment Addition Postulate (Post. 1.2), 14–15
triangle congruence, 241  Regular polygon angle measures in, 611 areas of, 609–610, 612–613, 657 defined, 361  Related conditional statements, 67  Relationships between special parallelograms, 389  Relationships within triangles, 298 bisectors of triangles, 309–341, 350 indirect proof and inequalities in one triangle, 335–339, 352 inequalities in two triangles, 343–346, 352 medians and altitudes of triangles, 319–323, 351 perpendicular and angle bisectors, 301–305, 350 triangle midsegments, 329–332, 351  Relative frequencies, finding, conditional, 685–686 joint and marginal, 685–686 Remember complete the square, 577	(Thm. 2.3), 106  Right cone, 642  Right Triangle Similarity Theorem (Thm. 9.6), 478  Right triangles in circumscribed circle, 311 classifying, 232 orthocenter of, 322 similar, 477–481, 519 identifying, 478–479 using geometric mean, 480–481 solving, 501–504, 521 using inverse trigonometric ratios, 502 special, side lengths of 30°-60°-90° triangle, 471, 473 isosceles (45°-45°-90°), 471, 472 standard position for, 462  Right triangles and trigonometry, 460 cosine ratio, 493–497, 520–521 Law of Cosines, 507–508, 511–512, 522 Law of Sines, 507–510, 522	scale factor  defined, 208  of dilation, 415  negative, 210  of similar solids, 630  units in, and finding, 211  Scalene triangle, classifying, 232  Secant, 530  Secant segment, 571–572  Sector of circle  area of, 601, 604–605, 656  defined, 604  Segment(s)  construction, bisecting a segment,  21  defined, and naming, 5  finding length of, 19, 20  finding midpoint of, 19  length in proportional triangles, 446  measuring and constructing, 11–15,  56  congruent segments, 13  Ruler Postulate (Post. 1.1), 12  Segment Addition Postulate

proof of Symmetric Property of	Sides	Sketching
Segment Congruence, 101	classifying triangles by, 232–233	diagram, 86
Properties of Segment Congruence	defined, of angle, 38	intersections of lines and planes, 6
(Thm. 2.1), 101	finding side lengths in special right	solids of revolution, 620
relationships in circles, 569–572,	triangles, 471–474, 518	Skew lines, 126
585	lengths of, 338, 339	Slant height (of right cone), 642
chords, secants, and tangents,	of polygons, 30	Slope-intercept form, 158
570–572		Slope of line
that intersect circles, 529–533, 582	relating to angles of triangle, 335,	-
Segment Addition Postulate	337–338	defined, 156
(Post. 1.2), 14–15	using side similarity to prove	finding, 123
	triangle similarity, 435–438,	proving criteria using similar
Segment bisector(s), 20	455	triangles, 439–440
construction	Similar arcs, 541	Slopes of Parallel Lines (Thm. 3.13),
bisecting a segment, 21	Similar Circles Theorem (Thm. 10.5),	157–158
of perpendicular bisector, 149	541	proof of, 439
defined, 20	Similar figures	Slopes of Perpendicular Lines
and midpoints, 20–21	defined, 216	( <b>Thm. 3.14</b> ), 157–158
Segments of a chord, 570	identifying, 171	proof of, 440
Segments of Chords Theorem		<b>Solids,</b> <i>See</i> Three-dimensional figures
( <b>Thm. 10.18</b> ), 570	proving similarity, 218	Solids of revolution, 620
Segments of Secants and Tangents	right triangles (See Triangle	Solve a right triangle, 503
<b>Theorem (Thm. 10.20),</b> 572	similarity, right triangles)	
<b>Segments of Secants Theorem</b>	triangles (See Triangle similarity)	Spheres C (40, (40,
( <b>Thm. 10.19</b> ), 571	Similar polygons, 417–422, 454	diameter of, 648, 649
Semicircle, 538	areas of, 421	surface area of, 647–649, 660
Side-Angle-Side (SAS)	comparing triangles after dilation,	volumes of, 650–651, 660
congruence, 245–248, 273	417	Spherical cap, 654
construction, copying a triangle	corresponding lengths, 419	<b>Spherical geometry,</b> 88, 136, 154, 258,
using SAS, 248	corresponding parts of, 418	268, 308, 348, 426
and properties of shapes, 247	determining if polygons are similar,	Square
using Law of Cosines to solve	422	defined, 388
_		perimeter and area, 31
triangle, 511	perimeters of, 420	Square Corollary (Cor. 7.4), 388
Side-Angle-Side (SAS) Congruence	Similar solids	SSA, See Side-Side-Angle (SSA)
Theorem (Thm. 5.5), 246	defined, 630	SSS, See Side-Side (SSS)
Side-Angle-Side (SAS) Similarity	finding volume of, 630, 638, 644	Standard equation of a circle,
<b>Theorem (Thm. 8.5),</b> 438	Similarity, 414	576–577
triangle similarity theorems	proportionality theorems, 445–449,	
compared, 439	456	Standard position for right triangle,
Side-Side-Angle (SSA), 264	proving slope criteria using similar	462
special case for right triangles,	triangles, 439–440	Straight angle, 39
264–265	proving triangle similarity	Straightedge, 13
using Law of Sines to solve triangle,	by AA, 427–430, 454	Structure, Throughout. See for
509	by SAS, 438, 455	example:
Side-Side (SSS)	•	in corresponding parts of similar
congruence, 261–265, 273	by SSS, 435–437, 455	polygons, 418
construction, copying a triangle	similar polygons, 417–422, 454	in dilation, 416
using SSS, 264	and transformations, 215–218, 224,	to solve multi-step equation, 357
using, 262–264	418	Study Skills
using Law of Cosines to solve	and dilations, 215	Analyze Your Errors: Type of Error,
triangle, 512	and rigid motions, 215	and Corrective Action, 145
Side-Side (SSS) Congruence	Similarity statements, 418	Form a Weekly Study Group, Set Up
Theorem (Thm. 5.8), 262	Similarity transformations, 216–217	Rules, 485
Side-Side (SSS) Similarity	Sine ratio, 493–497, 520–521	
	of 45° and 30° angles, 496	Keep Your Mind Focused during
<b>Theorem (Thm. 8.4),</b> 436	of complementary angles, 494	Class, 385
proof of, 437	defined, 494	Keeping a Positive Attitude, 197
triangle similarity theorems	finding leg lengths, 495	Keeping Your Mind Focused, 27
compared, 439		Keeping Your Mind Focused While
using, 436–437	inverse, 502	Completing Homework, 551

Kinesthetic Learners, 623 Making a Mental Cheat Sheet, 691 Rework Your Notes, 327 Take Control of Your Class Time, 433 Use Your Preferred Learning

Modality Visual, 259 Using the Features of Your Textbook

to Prepare for Quizzes and Tests, 89

**Substitution Property of Equality, 92** Subtend, 554

**Subtraction Property of Equality, 92** Success of trial, 671

Supplementary angles

defined, 48-49 proving cases, 107

Surface area

of cones, 641-642 of prism, 591 of spheres, 647-649, 660

**Syllogism** 

example of, 64 Law of Syllogism, 78

Symmetric Property, 94 proof of angle congruence, 102, 110 proof of segment congruence, 101 triangle congruence, 241

Symmetry, rotational, 193



## Tangent(s)

constructing to a circle, 533 defined, 530 finding radius of circle, 532 using properties of, 532–533

## **Tangent and Intersected Chord Theorem (Thm. 10.14), 562**

**Tangent circles** 

defined, 528, 531 drawing and identifying common tangents, 531

## **Tangent Line to Circle Theorem** (Thm. 10.1), 532

**Tangent ratio,** 487–490, 520

calculating, 487 defined, 488 finding, 488–489 inverse, 502

Tangent segment, 571–572 **Terminal point,** of vector, 174 Tetrahedron, 617

Theorem, 101

**Theorems. Definition page,** see main entry for additional pages. 30°-60°-90° Triangle Theorem (Thm. 9.5), 473

45°-45°-90° Triangle Theorem (Thm. 9.4), 472

Alternate Exterior Angles Converse (Thm. 3.7), 139

Alternate Exterior Angles Theorem (Thm. 3.3), 132

Alternate Interior Angles Converse (Thm. 3.6), 139

Alternate Interior Angles Theorem (Thm. 3.2), 132

Angle-Angle-Side (AAS) Congruence Theorem (Thm. 5.11), 271

Angle-Angle (AA) Similarity Theorem (Thm. 8.3), 428

Angle Bisector Theorem (Thm. 6.3), 304

Angle-Side-Angle (ASA) Congruence Theorem (Thm. 5.10), 270

Angles Inside the Circle Theorem (Thm. 10.15), 563

Angles Outside the Circle Theorem (Thm. 10.16), 563

Areas of Similar Polygons (Thm. 8.2), 421

Base Angles Theorem (Thm. 5.6),

Centroid Theorem (Thm. 6.7), 320 Ceva's Theorem, 452

Circumcenter Theorem (Thm. 6.5), 310

Circumscribed Angle Theorem (Thm. 10.17), 564

Composition Theorem (Thm. 4.1), 176

Congruent Central Angles Theorem (Thm. 10.4), 540

Congruent Circles Theorem (Thm. 10.3), 540

Congruent Complements Theorem (Thm. 2.5), 107

Congruent Corresponding Chords Theorem (Thm. 10.6), 546

Congruent Supplements Theorem (Thm. 2.4), 107

Consecutive Interior Angles Converse (Thm. 3.8), 139

Consecutive Interior Angles Theorem (Thm. 3.4), 132

Contrapositive of the Triangle Proportionality Theorem, 447

Converse of the Angle Bisector Theorem (Thm. 6.4), 304

Converse of the Base Angles Theorem (Thm. 5.7), 252

Converse of the Hinge Theorem (Thm. 6.13), 344

Converse of the Perpendicular Bisector Theorem (Thm. 6.2),

Converse of the Pythagorean Theorem (Thm. 9.2), 466

Converse of the Triangle Proportionality Theorem (Thm. 8.7), 446

Corresponding Angles Converse (Thm. 3.5), 138

Corresponding Angles Theorem (Thm. 3.1), 132

**Equidistant Chords Theorem** (Thm. 10.9), 548

Exterior Angle Inequality Theorem,

Exterior Angle Theorem (Thm. 5.2), 234

**External Tangent Congruence** Theorem (Thm. 10.2), 532

Geometric Mean (Altitude) Theorem (Thm. 9.7), 480

Geometric Mean (Leg) Theorem (Thm. 9.8), 480

Hinge Theorem (Thm. 6.12), 344 Hypotenuse-Leg (HL) Congruence Theorem (Thm. 5.9), 264

Incenter Theorem (Thm. 6.6), 313 Inscribed Angles of a Circle

Theorem (Thm. 10.11), 555 Inscribed Quadrilateral Theorem

(Thm. 10.13), 556 **Inscribed Right Triangle Theorem** (Thm. 10.12), 556

Inverse of the Triangle Proportionality Theorem, 447

Isosceles Trapezoid Base Angles Converse (Thm. 7.15), 399

Isosceles Trapezoid Base Angles Theorem (Thm. 7.14), 399

Isosceles Trapezoid Diagonals Theorem (Thm. 7.16), 399

Kite Diagonals Theorem (Thm. 7.18), 401

Kite Opposite Angles Theorem (Thm. 7.19), 401

Law of Cosines (Thm. 9.10), 511 Law of Sines (Thm. 9.9), 509

Linear Pair Perpendicular Theorem (Thm. 3.10), 150

Lines Perpendicular to a Transversal Theorem (Thm. 3.12), 150

Measure of an Inscribed Angle Theorem (Thm. 10.10), 554

Opposite Sides Parallel and Congruent Theorem (Thm. 7.9), 378

Parallelogram Consecutive Angles	Segments of Secants Theorem	solids of revolution, 620
Theorem (Thm. 7.5), 369	(Thm. 10.19), 571	Three Parallel Lines Theorem
Parallelogram Diagonals Converse	Side-Angle-Side (SAS) Congruence	( <b>Thm. 8.8</b> ), 448
(Thm. 7.10), 378	Theorem (Thm. 5.5), 246	Three Point Postulate (Post. 2.4), 84
Parallelogram Diagonals Theorem	Side-Angle-Side (SAS) Similarity	Tools, See Dynamic geometry
(Thm. 7.6), 369	Theorem (Thm. 8.5), 438	software
Parallelogram Opposite Angles	Side-Side-Side (SSS) Congruence	Transformation(s), 170
Converse (Thm. 7.8), 376	Theorem (Thm. 5.8), 262	congruence and, 199-203, 223
Parallelogram Opposite Angles	Side-Side (SSS) Similarity	defined, 174
Theorem (Thm. 7.4), 368	Theorem (Thm. 8.4), 436	dilations, 207–211, 224
Parallelogram Opposite Sides	Similar Circles Theorem	identifying, 171
Converse (Thm. 7.7), 376	(Thm. 10.5), 541	reflections, 181–185, 222
Parallelogram Opposite Sides	Slopes of Parallel Lines (Thm. 3.13),	rotations, 189–193, 223
Theorem (Thm. 7.3), 368	157	similarity and, 215–218, 224, 418
Perimeters of Similar Polygons	Slopes of Perpendicular Lines	translations, 173–177, 222
(Thm. 8.1), 420	(Thm. 3.14), 157	Transitive Property, 94
Perpendicular Bisector Theorem	Tangent and Intersected Chord	triangle congruence, 241
(Thm. 6.1), 302	Theorem (Thm. 10.14), 562	Transitive Property of Parallel Lines
Perpendicular Chord Bisector	Tangent Line to Circle Theorem	(Thm. 3.9), 141
Converse (Thm. 10.8), 546	(Thm. 10.1), 532	Translation(s), 173–177, 222
Perpendicular Chord Bisector	Third Angles Theorem (Thm. 5.4),	defined, 174
Theorem (Thm. 10.7), 546	242	of figure in coordinate plane, 175
Perpendicular Transversal Theorem	Three Parallel Lines Theorem	of figure using vector, 175
(Thm. 3.11), 150	(Thm. 8.8), 448	performing compositions, 176
Polygon Exterior Angles Theorem	Transitive Property of Parallel Lines	performing translations, 174–175
(Thm. 7.2), 362	(Thm. 3.9), 141	of triangle in coordinate plane, 173
Polygon Interior Angles Theorem	Trapezoid Midsegment Theorem	Translation Postulate (Post. 4.1), 176
(Thm. 7.1), 360	(Thm. 7.17), 400	Transversal(s)
Properties of Angle Congruence	Triangle Angle Bisector Theorem	angles formed by, 128 defined, 128
(Thm. 2.2), 101	(Thm. 8.9), 449	and parallel lines, 131–134, 164
Properties of Segment Congruence	Triangle Inequality Theorem	Trapezoid(s), 397–400, 410
(Thm. 2.1), 101	(Thm. 6.11), 339	in coordinate plane, 398
Properties of Triangle Congruence	Triangle Larger Angle Theorem	defined, 398
(Thm. 5.3), 241	(Thm. 6.10), 337	isosceles, 398–399
Pythagorean Inequalities Theorem	Triangle Longer Side Theorem	making conjecture about, 397
(Thm. 9.3), 467	(Thm. 6.9), 337	midsegment of, 400
Pythagorean Theorem (Thm. 9.1),	Triangle Midsegment Theorem	properties of, 398–399
464	(Thm. 6.8), 331	Trapezoid Midsegment Theorem
Rectangle Diagonals Theorem	Triangle Proportionality Theorem	( <b>Thm. 7.17</b> ), 400
(Thm. 7.13), 391	(Thm. 8.6), 446	Tree diagram, 699
Reflections in Intersecting Lines	Triangle Sum Theorem (Thm. 5.1),	Trials of probability experiment, 671
Theorem (Thm. 4.3), 203	233–234	<b>Triangle(s),</b> See also Right triangle
Reflections in Parallel Lines	Vertical Angles Congruence	altitude of, 319, 321–323, 351
Theorem (Thm. 4.2), 202	Theorem (Thm. 2.6), 108–110	angles of, 231–235, 290
Rhombus Diagonals Theorem	Theoretical probability, 668–670	angle measures of triangles,
(Thm. 7.11), 390	defined, 669	233–235
Rhombus Opposite Angles Theorem	finding, 669, 675	classifying triangles by sides and
(Thm. 7.12), 390	Third Angles Theorem (Thm. 5.4),	angles, 232–233
Right Angles Congruence Theorem	242	using angle-angle similarity,
(Thm. 2.3), 106		428-430
Right Triangle Similarity Theorem	Three-dimensional figures, 617–620,	area of, 1, 31
(Thm. 9.6), 478	657–658	using trigonometric ratios, 508
Segments of Chords Theorem	classifying solids, 618	bisectors of (See Bisectors of
(Thm. 10.18), 570	cross sections, 619	triangles)
Segments of Secants and Tangents	nets for, 592	centroid of, 320-321, 323
Theorem (Thm. 10.20), 572	Platonic solids, 617	circumcenter of, 310–312

classifying by Pythagorean inequalities, 467 classifying by sides and angles, 232-233 comparing measures in, 344-345 congruent (See Congruent triangles) construction, copying a triangle using SAS, 248 examples of segments, lines, rays, and points in, 300, 323 incenter of, 313-314 inequalities in one triangle, 339 in two triangles, 343–346, 352 median of, 320-321 midsegments, 329-332, 351 perimeter of, 31 proportionality, 446-447, 449 proving congruence by ASA and AAS, 269–273, 292-293 by SAS, 245-248, 291 by SSS, 261-265, 292 relating sides and angles, 335, 337–338, 352 **Triangle Angle Bisector Theorem** (Thm. 8.9), 449 **Triangle Inequality Theorem** (Thm. 6.11), 339 **Triangle Larger Angle Theorem** (Thm. 6.10), 337 **Triangle Longer Side Theorem** (Thm. 6.9), 337 **Triangle Midsegment Theorem** (**Thm. 6.8**), 331–332

**Triangle Proportionality Theorem** (Thm. 8.6), 446 contrapositive of, 447 converse of, 446 inverse of, 447 **Triangle similarity** deciding if triangles are similar, 435 proving by AA, 427–430, 454 proving by SAS, 438, 455 proving by SSS, 436-437, 455 proving slope criteria using similar

triangles, 439-440

Triangle Sum Theorem (Thm. 5.1), **Trigonometric ratio(s),** See also

Trigonometry, See Right triangles and trigonometry Truth table, 70 Truth value of statement, 70 Two-column proof concept summary of, 102, 110 defined, 100 writing, 100, 102 writing for parallelograms, 370 Two-Point Postulate (Post. 2.1), 84 Two-way frequency table, 684 Two-way table(s), 683–687, 715 defined, 684 making, 684 and Venn diagram, 683 Undefined terms of geometry, 4 Union of events, 694–695 Unit circle trigonometry, 462

right triangles, 477-481, 519

using geometric mean, 480–481

Cosine ratio; Sine ratio;

identifying, 478–479

233-234

defined, 488

Tangent ratio

finding areas of triangles, 508

converting between customary and metric units of length, 2 nonstandard units, to measure line segments, 11

Units of measure

Vector(s)



defined, 174 translating a figure using, 175 Venn diagram classifying parallelograms, 389 classifying quadrilaterals, 358

reasoning with, 75

and two-way table, 683

Vertex

defined, of angle, 38 in polygons, 30 of polyhedron, defined, 617, 618

Vertex angle (of isosceles triangle), 252

Vertical angles, 50

of cone, 642

**Vertical Angles Congruence Theorem** (Thm. 2.6), 108–110, 133

Vertical component, 174 Vertical lines, 157

Vertical stretch, and nonrigid

transformation, 211

Volume(s)

651 of cones, 641, 643-644, 659-660 of cylinders, 625–627, 629–630, 658 defined, of solid, 626 and density, 628 of prisms, 625-627, 629-630, 658 of pyramids, 635-638, 659 of similar solids, 630, 638, 644 of spheres, 650-651, 660 of spherical cap, 654

of composite solid, 630, 638, 644,

**Volume Addition Postulate, 633** 



Wheel of Theodorus, 476 **Writing,** *Throughout. See for example:* conjecture on angles of triangle, 231 conjecture on isosceles triangles,

251 a coordinate proof, 283, 284, 286 coordinate proofs involving circles, 578 an indirect proof, 336