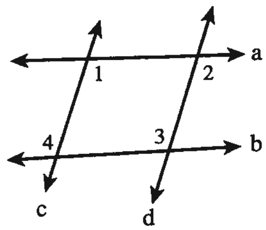
2.2 Exercise Set

1. Given: $c \parallel d$

$\angle 1 = \angle 3$

Prove: $a \parallel b$

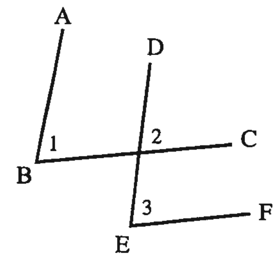


	Statement	Reason
1.	$c \parallel d$	
2.		given
3.	$\angle 3 = \angle 4$	
4.	$\angle 1 = \angle 4$	
5.	$a \parallel b$	alternate interior $\angle$s

2. Given: $\angle 1 = \angle 2$

$\angle 1 = \angle 3$

Prove: $BC \parallel EF$

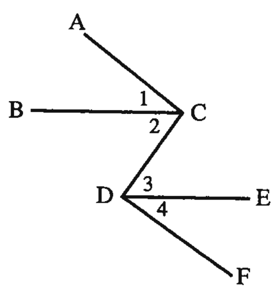


	Statement	Reason
1.	$\angle 1 = \angle 2$	
2.	$\angle 1 = \angle 3$	
3.	$\angle 2 = \angle 3$	
4.		

3. Given: $\angle ACD = \angle CDF$

$\angle 1 = \angle 4$

Prove: $BC \parallel DE$



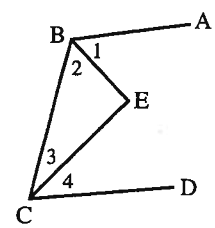
	Statement	Reason
1.	$\angle ACD = \angle CDF$	
2.	$\angle 1 + \angle 2 = \angle 3 + \angle 4$	addition of angles
3.	$\angle 1 = \angle 4$	
4.	$\angle 1 + \angle 2 = \angle 3 + \angle 1$	
5.	$\angle 2 = \angle 3$	
6.	$BC \parallel DE$	

4. Given: BE bisects $\angle ABC$

CE bisects $\angle BCD$

$\angle 2 + \angle 3 = 90°$

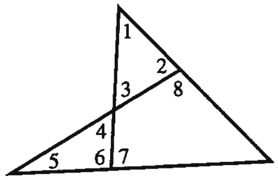
Prove: $AB \parallel CD$



	Statement	Reason
1.	BE bisects $\angle ABC$	
2.	$\angle 1 = \angle 2$	definition of bisect
3.	CE bisects $\angle BCD$	
4.		
5.	$\angle 2 + \angle 3 = 90°$	
6.	$\angle 2 + \angle 2 + \angle 3 + \angle 3 =$	addition
7.	$\angle 1 + \angle 2 + \angle 3 + \angle 4 =$	
8.	$AB \parallel CD$	

5. Given: $\angle 1 = \angle 5$

Prove: $\angle 7 = \angle 8$

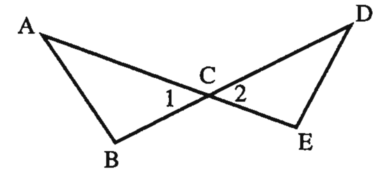


	Statement	Reason
1.	$\angle 1 = \angle 5$	______________
2.	______________	vertical angles
3.	______________	third angle of a Δ
4.	______________	supplementary $\angle$s to equal $\angle$s

6. Given: $AB \perp BD$

$DE \perp AE$

Prove: $\angle A = \angle D$



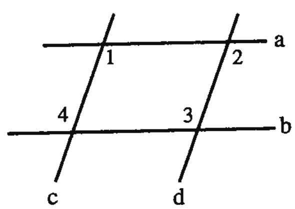
	Statement	Reason
1.	$AB \perp BD$	______________
2.	$DE \perp AE$	______________
3.	$\angle B = \angle E$	______________
4.	$\angle 1 = \angle 2$	______________
5.	$\angle A = \angle D$	______________

Prove the following:

7. Given: $a \parallel b$

$\angle 2 = \angle 4$

Prove: $c \parallel d$

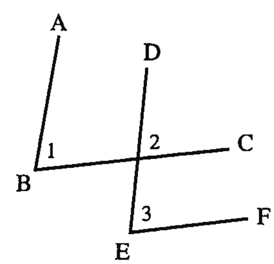


Statement	Reason

8. Given: $BC \parallel EF$

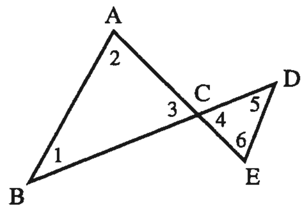
$\angle 1 = \angle 3$

Prove: $AB \parallel DE$



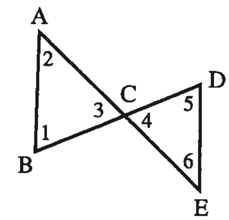
Statement	Reason

9. Given: $\angle 2 = \angle 6$
Prove: $\angle 1 = \angle 5$



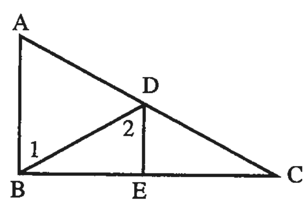
Statement	Reason

10. Given: $\angle 1 = \angle 3$
$\angle 4 = \angle 5$
Prove: AB || DE



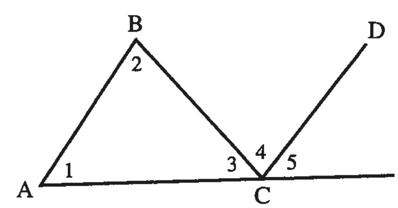
Statement	Reason

11. Given: $AB \perp BC$
$DE \perp BC$
Prove: $\angle 1 = \angle 2$



Statement	Reason

12. Given: $\angle 1 = \angle 5$
Prove: $\angle 2 = \angle 4$



Statement	Reason

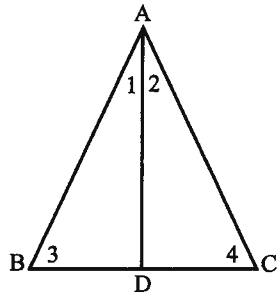
13. Given:

$\angle 3$ is complementary to $\angle$

$\angle 4$ is complementary to $\angle$

AD bisects $\angle BAC$

Prove: $\angle 3 = \angle 4$

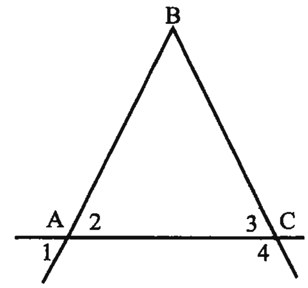


Statement	Reason

14. Given:

$\angle 1$ is supplementary to $\angle$

Prove: $\angle 2 = \angle 3$

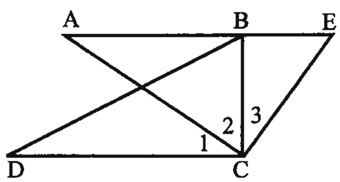


Statement	Reason

15. Given: $BC \perp CD$

$AC \perp CE$

Prove: $\angle 1 = \angle 3$

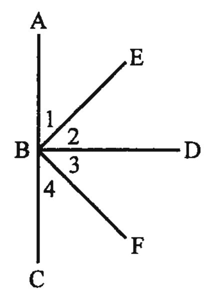


Statement	Reason

16. Given: $AC \perp BD$

BD bisects $\angle EBF$

Prove: $\angle 1 = \angle 4$

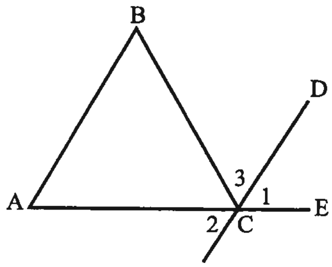


Statement	Reason

17. Given: $\angle 2 = \angle 3$

Prove:

$\overrightarrow{CD}$ bisects $\angle BCE$

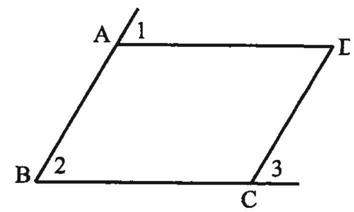


Statement	Reason

18. Given: $\angle 1 = \angle 3$

$AB \parallel CD$

Prove: $AD \parallel BC$



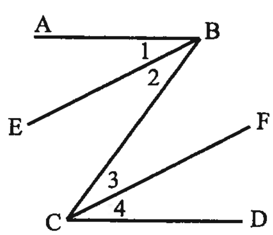
Statement	Reason

19. Given: $AB \parallel CD$

$\overrightarrow{BE}$ bisects $\angle ABC$

$\overrightarrow{CF}$ bisects $\angle BCD$

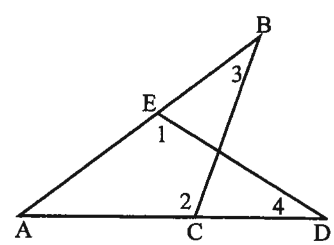
Prove: $\angle 2 = \angle 3$



Statement	Reason

20. Given: $\angle 1 = \angle 2$

Prove: $\angle 3 = \angle 4$

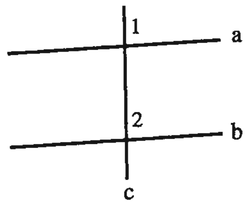


Statement	Reason

21. Given: $c \perp b$

$a \parallel b$

Prove: $c \perp a$



Statement	Reason

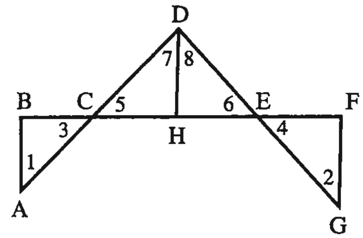
22. Given: $AB \perp BF$

$FG \perp BF$

$DH \perp BF$

$\angle 1 = \angle 2$

Prove: $\angle 7 = \angle 8$



Statement	Reason

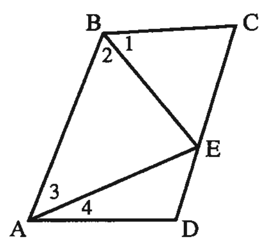
Challenge proofs

23. Given: $BC \parallel AD$

$\angle 1 = \angle 2$

$\angle 3 = \angle 4$

Prove: $BE \perp AE$



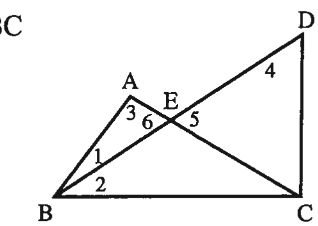
Statement	Reason

24. Given: BD bisects $\angle ABC$

$AB \perp AC$

$DC \perp BC$

Prove: $\angle 4 = \angle 5$



Statement	Reason

2.2 Exercise Set (Reasons can vary)

1.

	Statement	Reason
1.	$\angle 1 = \angle 3$	given
2.		
3.		corresponding $\angle$
4.		both = to $\angle 3$

2.

	Statement	Reason
1.		given
2.		given
3.		both = to $\angle 1$
4.	BC || EF	corresponding $\angle$s

3.

	Statement	Reason
1.		given
2.		
3.		given
4.		substitution
5.		subtraction
6.		alternate interior $\angle$s

4.

	Statement	Reason
1.		given
2.		
3.		given
4.	$\angle 3 = \angle 4$	definition of bisector
5.		given
6.		
7.		substitution
8.		co-interior $\angle$s

5.

	Statement	Reason
1.		given
2.	$\angle 3 = \angle 4$	
3.	$\angle 2 = \angle 6$	
4.	$\angle 7 = \angle 8$	

6.

	Statement	Reason
1.		given
2.		given
3.		each 90°
4.		vertical $\angle$s
5.		3rd $\angle$ of a Δ

For questions 7 to 24, proof methods can vary.

7.

Statement	Reason
a || b	given
$\angle 2 = \angle 3$	alternate interior $\angle$s
$\angle 2 = \angle 4$	given
$\angle 3 = \angle 4$	both = to $\angle 2$
c || d	corresponding $\angle$s

8.

Statement	Reason
BC || EF	given
$\angle 2 = \angle 3$	corresponding $\angle$s
$\angle 1 = \angle 3$	given
$\angle 1 = \angle 2$	both = to $\angle 3$
AB || DE	corresponding $\angle$s

9.

Statement	Reason
$\angle 2 = \angle 6$	given
$\angle 3 = \angle 4$	vertical $\angle$ s
$\angle 1 = \angle 5$	3rd $\angle$ of a Δ

10.

Statement	Reason
$\angle 1 = \angle 3$	given
$\angle 4 = \angle 5$	given
$\angle 3 = \angle 4$	vertical $\angle$ s
$\angle 1 = \angle 5$	substitution
$AB \parallel DE$	alternate interior $\angle$ s

11.

Statement	Reason
$AB \perp BC$	given
$DE \perp BC$	given
$AB \parallel DE$	both $\perp$ to BC
$\angle 1 = \angle 2$	alternate interior $\angle$ s

12.

Statement	Reason
$\angle 1 = \angle 5$	given
$AB \parallel CD$	corresponding $\angle$ s
$\angle 2 = \angle 4$	alternate interior $\angle$ s

13.

Statement	Reason
$\angle 3$ comp to $\angle 1$	given
$\angle 1 + \angle 3 = 90°$	defn of complementary
$\angle 4$ comp to $\angle 2$	given
$\angle 2 + \angle 4 = 90°$	defn of complementary
$\angle 1 + \angle 3 = \angle 2 + \angle 4$	both = to 90°
AD bisects $\angle BAC$	given
$\angle 1 = \angle 2$	defn of bisect
$\angle 3 = \angle 4$	subtraction

14.

Statement	Reason
$\angle 1$ supp to $\angle 4$	given
$\angle 1 + \angle 4 = 180°$	defn of supplementary
$\angle 3 + \angle 4 = 180°$	supplementary $\angle$ s
$\angle 1 = \angle 3$	both = to 180°
$\angle 1 = \angle 2$	vertical angles
$\angle 2 = \angle 3$	both = to $\angle 1$

15.

Statement	Reason
$BC \perp CD$	given
$\angle BCD = 90°$	defn of $\perp$
$\angle 1 + \angle 2 = 90°$	$\angle BCD = \angle 1 + \angle 2$
$AC \perp CE$	given
$\angle ACE = 90°$	defn of $\perp$
$\angle 3 + \angle 2 = 90°$	$\angle ACE = \angle 3 + \angle 2$
$\angle 1 = \angle 3$	subtraction (steps 3 and 6)

16.

Statement	Reason
$AC \perp BD$	given
$\angle 1 + \angle 2 = \angle 3 + \angle 4$	$\perp \angle$ s are =
BD bisects $\angle EBF$	given
$\angle 2 = \angle 3$	defn of bisect
$\angle 1 = \angle 4$	subtraction

17.

Statement	Reason
$\angle 1 = \angle 2$	vertical $\angle$s
$\angle 2 = \angle 3$	given
$\angle 1 = \angle 3$	both = $\angle 2$
CD bisects $\angle BCE$	defn of bisect

18.

Statement	Reason
$AB \parallel CD$	given
$\angle 2 = \angle 3$	corresponding $\angle$s
$\angle 1 = \angle 3$	given
$\angle 1 = \angle 2$	both = $\angle 3$
$AD \parallel BC$	corresponding $\angle$s

19.

Statement	Reason
$AB \parallel CD$	given
$\angle 1 + \angle 2 = \angle 3 + \angle 4$	alternate interior $\angle$s
BE bisects $\angle ABC$	given
$\angle 1 = \angle 2$	defn of bisect
CF bisects $\angle BCD$	given
$\angle 3 = \angle 4$	defn of bisect
$\angle 2 + \angle 2 = \angle 3 + \angle 3$	substitution
$\angle 2 = \angle 3$	division

20.

Statement	Reason
$\angle 1 = \angle 2$	given
$\angle A = \angle A$	same $\angle$
$\angle 3 = \angle 4$	3rd $\angle$s of a ΔABC and ΔADE

21.

Statement	Reason
$a \parallel b$	given
$\angle 1 = \angle 2$	corresponding $\angle$s
$c \perp b$	given
$\angle 2 = 90°$	$\perp \angle s = 90°$
$\angle 1 = 90°$	$\angle 1 = \angle 2$
$c \perp a$	90° $\angle$s are $\perp$

22.

Statement	Reason
$AB \perp BF$	given
$FG \perp BF$	given
$DH \perp BF$	given
$AB \parallel DH \parallel EG$	all $\perp$ to BF
$\angle 1 = \angle 7$	alternate interior $\angle$s
$\angle 2 = \angle 8$	alternate interior $\angle$s
$\angle 1 = \angle 2$	given
$\angle 7 = \angle 8$	substitution

23.

Statement	Reason
$BC \parallel AD$	given
$\angle 1+\angle 2+\angle 3+\angle 4=180°$	co-interior $\angle$s
$\angle 1=\angle 2$	given
$\angle 3=\angle 4$	given
$\angle 2+\angle 2+\angle 3+\angle 3=180°$	substitution
$\angle 2+\angle 3=90°$	division
$\angle 2+\angle 3+\angle BEA=180°$	sum of $\angle$s in a Δ
$90°+\angle BEA=180°$	substitution
$\angle BEA=90°$	subtraction
$BE \perp AE$	defn of $\perp$

24.

Statement	Reason
BD bisects $\angle ABC$	given
$\angle 1=\angle 2$	defn of bisect
$AB \perp AC$	given
$\angle 3=90°$	defn of $\perp$
$\angle 1+\angle 6=90°$	sum of $\angle$s in a Δ
$DC \perp BC$	given
$\angle 2+\angle 4=90°$	sum of $\angle$s in a Δ
$\angle 1+\angle 6=\angle 2+\angle 4$	both = to 90°
$\angle 2+\angle 6=\angle 2+\angle 4$	substitution
$\angle 6=\angle 4$	subtraction
$\angle 5=\angle 6$	vertical angles
$\angle 4=\angle 5$	both = to $\angle 6$

2.3 Exercise Set

1. a) 3240° **b)** 2700° **c)** 6660° **d)** 3780° **e)** $(x-2)180°$ **f)** $(y-2)180°$

2. a) 4 **b)** 15 **c)** 10 **d)** 360 **e)** 15 **f)** 24

3. a) 90° **b)** 135° **c)** 152.3° **d)** 158.8° **e)** $\frac{(x-2)}{x}180°$ **f)** $\frac{(y-2)}{y}180°$

4. a) 20° **b)** 32.7° **c)** 15.7° **d)** 17.1° **e)** 12.4° **f)** 8°

5. a) $\angle 1 = 72°$, $\angle 2 = 108°$ **b)** 720°, 360° **c)** $\angle 1 = 168°$, $\angle 2 = 42°$ **d)** $67\frac{1}{2}$
e) 24 **f)** 27 **g)** 1800° **h)** 84°

6. a) 4 **b)** 3 **c)** 6 **d)** 8 **e)** 10 **f)** 12

7. 40°, 45°, 60°

8. 60°

9. 108°

10. parallel

11. perpendicular

12. 24

13. a) 36° **b)** 60°

14. 180°

15. $\frac{n(n-3)}{2}$