

Number Sense – AP Book 7, Part 1: Unit 3

AP Book NS7-9

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1. a) 12, 15, 18
b) 4: 0, 4, 8, 12, 16, 20, 24
c) 5: 0, 5, 10, 15, 20, 25, 30
2. a) Yes
b) No
c) Yes; Yes; Yes
3. a) 0
b) All whole numbers, since any whole number times zero is zero.
4. b) 1 is a factor of 9.
c) 8 is a factor of 0.
d) 4 is not a factor of 11.

INVESTIGATION

- A. b) 6, 8, 10, 12
c) 9, 12
d) 8, 12
e) 10, 15
f) 12
g) 14
h) 16
i) 18
j) 20
k) 22
l) --
m) 13
- B. The largest factor of any number n is n since dividing by anything larger than n won't result in a whole number.
- C. a) 1, 2, 3, 4, 6, 12
b) Yes

5. a) 0, 0, 0
b) No
c) No
d) 0
e) 0
6. a) 0, 13, 26, ...
b) All whole numbers are factors of themselves.

7. a) 0, 1, 2, 3, 4, 5, 6, 7, 8
b) All whole numbers have 1 as a factor (since 1 divides evenly into all numbers).
8. a) 0
0
0
0
b) Any number n .
No.
c) All numbers are factors of 0 since any number times 0 is 0.
9. a) 1 is a factor of 5.
b) 1 is a factor of every number.
c) 8 is a factor of 8.
d) Every number has itself as a factor.
e) 7 is a factor of 0.
f) Every number is a factor of 0.
10. a) 15 is a multiple of 5.
b) 0 is a multiple of 3.
c) Any non-zero multiple of 12 is at least 12.
d) Any non-zero multiple of a number is at least that number.
e) 6 is a multiple of 6.
f) Any number is a multiple of itself.

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1. a) Since 10 is the largest possible factor of 10.
b) 0 is not a factor of 10 (or of any number).

2. a)

1 st	2 nd
1	6
2	3
3	2
4	-
5	-
6	1

b)

1 st	2 nd
1	8
2	4
3	-
4	2
5	-
6	-
7	-
8	1

c)

1 st	2 nd
1	9
2	-
3	3
4	-
5	-
6	-
7	-
8	-
9	1

3. a) Cross out (3,2) and (6,1).
b) Cross out (4,2) and (8,1).
c) Cross out (9,1).
4. a) Connor notices that, as the 1st column increases, the 2nd column decreases.
b) Since 7 isn't a factor of 24 and (4,6) would be the next pair \approx (6,4), all factor pairs are listed already.
5. Any remaining pairs of factors would be ones that he has already but in reverse order.

6. a)

1 st	2 nd
1	20
2	10
3	-
4	5
5	4

b)

1 st	2 nd
1	12
2	6
3	4
4	3

c)

1 st	2 nd
1	15
2	-
3	5
4	-
5	3

d)

1 st	2 nd
1	14
2	7
3	-
4	-
5	-
6	-
7	2

e)

1 st	2 nd
1	25
2	-
3	-
4	-
5	5

f)

1 st	2 nd
1	5
2	-
3	-
4	-
5	1

g)

1 st	2 nd
1	26
2	13
3	-
4	-
5	-
6	-

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g) *continued*

7	-
8	-
9	-
10	-
11	-
12	-
13	2

h)

1 st	2 nd
1	30
2	15
3	10
4	-
5	6
6	5

i)

1 st	2 nd
1	42
2	21
3	14
4	-
5	-
6	7
7	6

j)

1 st	2 nd
1	72
2	36
3	24
4	18
5	-
6	12
7	-
8	9
9	8

k)

1 st	2 nd
1	63
2	-
3	21
4	-
5	-
6	-
7	9
8	-
9	7

l)

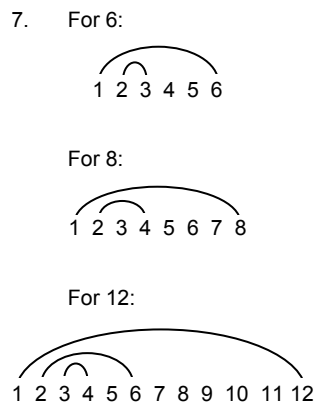
1 st	2 nd
1	100
2	50
3	-
4	25
5	20
6	-
7	-
8	-
9	-
10	10

m)

1 st	2 nd
1	64
2	32
3	-
4	16
5	-
6	-
7	-
8	8

n)

1 st	2 nd
1	91
2	-
3	-
4	-
5	-
6	-
7	13
8	-
9	-
10	-
11	-
12	-
13	7



8. Factor rainbows should include...
- 1, 2, 4
 - 1, 2, 4, 8
 - 1, 2, 3, 4, 6, 12
 - 1, 3, 5, 15
 - 1, 7
 - 1, 2, 3, 4, 6, 8, 12, 24
 - 1, 2, 3, 6, 7, 14, 21, 42
9. a) Yes
b) 144, 72, 48
36, 24, 12
c) It gets smaller.
d) 1, 2, 3, 4, 6, 12, 24, 36, 48, 72, 144
- These are not all of the factors, e.g. $8 \times 18 = 144$ (the products of factors are also factors: $2 \times 4 = 8$).
10. Since 3 256 is an even number, 2 is the next smallest factor... and the second largest factor is $3\,256 \div 2 = 1\,628$.

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- 18
- Teacher to check.
- 10, 20
 - 6, 12
 - 4, 8
 - 12, 24
 - 12, 24
 - 12, 24
- $2 \times$ (the first common multiple)
 - $2 \times 126 = 252$
- 6, 12, 18, 24
 - 30
- 10
 - 6
 - 4
 - 12

- 12
 - 20
 - 9
 - 6
 - 10
 - 14
 - 12
 - 8
 - 40
 - 15
 - 30
 - 30
 - 24
 - 18
- 1, 2, 4, 5, 10, 20
 - 1, 2, 11, 22
 - 1, 2, 13, 26
 - 1, 5, 13, 65
 - 1, 2, 3, 6, 11, 22, 33, 66

NOTE: You can stop dividing once you've divided by a factor that's at least half the number.
- 2
 - 22
 - 5
 - 1
 - 13
 - 1
 - 1
 - 2
- 10: 1, 2, 5, 10
15: 1, 3, 5, 15
 - 1, 5
 - GCF = 5
 - 18: 1, 2, 3, 6, 9, 18
24: 1, 2, 3, 4, 6, 8, 12, 24
 - 1, 2, 3, 6
 - GCF = 6
 - 20: 1, 2, 4, 5, 10, 20
30: 1, 2, 3, 5, 6, 10, 15, 30
 - 1, 2, 5, 10

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- iii) GCF = 10
- d) i) 28: 1, 2, 4, 7, 14, 28
42: 1, 2, 3, 6, 7, 14, 21, 42
- ii) 1, 2, 7, 14
- iii) GCF = 14
11. a) ii) 5: 1, 5
15: 1, 3, 5, 15
GCF = 5
- iii) 6: 1, 2, 3, 6
30: 1, 2, 3, 5, 6, 10, 15, 30
GCF = 6
- iv) 10: 1, 2, 5, 10
50: 1, 2, 5, 10, 25, 50
GCF = 10
- b) GCF = a

INVESTIGATION 1

- A. b) 20: 1, 2, 4, 5, 10, 20
21: 1, 3, 7, 21
GCF = 1
- c) 15: 1, 3, 5, 15
16: 1, 2, 4, 8, 16
GCF = 1
- d) 35: 1, 5, 7, 35
36: 1, 2, 3, 4, 6, 9, 12, 18, 36
GCF = 1

- B. GCF = 1

INVESTIGATION 2

- A. a) GCF = 1
LCM = 12
 $3 \times 4 = 12$
- b) GCF = 1
LCM = 10
 $2 \times 5 = 10$
- c) GCF = 2
LCM = 12
 $4 \times 6 = 24$
- d) GCF = 5
LCM = 30
 $10 \times 15 = 150$
- e) GCF = 5
LCM = 10
 $5 \times 10 = 50$

- f) GCF = 1
LCM = 15
 $1 \times 15 = 15$
- g) GCF = 1
LCM = 20
 $4 \times 5 = 20$
- h) GCF = 3
LCM = 18
 $6 \times 9 = 54$
- B. Circle: a), b), f) and g)
- C. GCF = 1

AP Book NS7-12

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1. Teacher to check drawings... the factors in each case are:
- a) 1, 2, 4
b) 1, 5
c) 1, 2, 3, 6
d) 1, 7
e) 1, 2, 4, 8
f) 1, 3, 9
2. 5, 7
3. 4, 9
4. No, since a prime number is only divisible by itself and 1.
5. a) Teacher to check.
b) 1, 4, 9, 16, 25
6. Teacher to check (6 by 6).
7. Teacher to check (1 by 10 and 2 by 5).
8. 1, 4, 9, 16, 25, 36, 49, 64, 81, 100
9. b) 9
c) 64
d) 0
e) 49
10. a) Yes
b) Since $131 < 132$, their squares will have the same relationship.
11. a) $3^2, 4^2, 5^2$
b) $8^2, 9^2, 10^2$
c) $5^2, 7^2, 12^2$

12. a) $4^2, 10, 3^2, 5, 2^2$
b) $85, 9^2, 8^2, 50, 7^2$
13. a) 3×3
b) 7×7
c) 0×0
d) 5×5
14. b) 4
c) 3
d) 6
e) 1
f) 10
g) 9
h) 8
15. b) 30
c) 5
d) 5
e) 15
f) 1
g) 3
h) 10

BONUS 17

16. b) 5
c) 9
d) 4 105
e) n
17. a) 5 cm
b) 7 mm
c) 10 km
18. a) The square with area 64 cm^2 has sides of length 8 cm; the other has sides of 6 cm.
b) $>$
19. a) $\sqrt{9}, \sqrt{16}, \sqrt{25}, \sqrt{49}, \sqrt{64}$
b) $\sqrt{4}, 5, \sqrt{8^2}, 3^2, \sqrt{100}, 4^2$
c) $\sqrt{81} - \sqrt{49}, \sqrt{16}, \sqrt{100} \div \sqrt{4}, \sqrt{4} \times \sqrt{9}, \sqrt{36} + \sqrt{4}, 3^2, \sqrt{100}$
20. They both use a raised 2.

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1. a) White circle
b) Shaded triangle
c) Small striped square
d) Large white square
2. a) American football
b) Bicycle, tricycle
c) thing
d) Who's there?, No way!
3. Because a banana is not a vehicle.
4. a) No, since 3 is not even, it can be paired with any letter.
b) (12,R), (J,16), (C,28)
5. a) (E,13), (U,3), (D,7)
b) True
c) True
d) (r, 15), (j, 3), (e, 5)
e) True
f) (r,15), (D,7), (j,3)
g) True
h) True
i) (E,13), (U,3), (D,7)
j) True
6. Answers will vary (though generally easier to prove it false with a counter-example).
7. a) C
B
b) A
F
c) D
E
8. Answers will vary for the counter-examples. Teacher to check.
a) Reverse: people, boys
b) Reverse: fruit, banana
c) Reverse: animals that live in the water, fish

Number Sense – AP Book 7, Part 1: Unit 3 (continued)

- d) Reverse: start with a capital letter, form a sentence
9. b) Statement is false. Reverse (all red fruits are apples) is also false.
- c) Statement is false. Reverse (all soccer players are girls) is also false.
- d) Statement is true. Reverse (all shapes are circles) is false.
- e) Statement is true. Reverse (all toonies are Canadian coins worth \$2) is also true.

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INVESTIGATION 1

- A. Are all whole numbers with ones digit 0 divisible by 10?

B. Teacher to check.

40	50	60	70	80	90
4	5	6	7	8	9

100	110	120	130	140	150
10	11	12	13	14	15

D. 1, 2, 3, 12, n

E. Yes.

INVESTIGATION 2

A.

8	10	12	14	16	18
4	5	6	7	8	9

20	22	24	26	28	30
10	11	12	13	14	15

B. n

INVESTIGATION 3

A.

10	13	16	19
3R1	4R1	5R1	6R1

20	23	26
6R2	7R2	8R2

B. 10

1. a) Reverse:
Any number that is "divisible by 2" has "ones digit divisible by 2."

b)

6	8	10	12	14	16
6	8	0	2	4	6

18	20	22	24	26	28
8	0	2	4	6	8

- c) 0, 2, 4, 6, 8 is a repeating pattern
- d) Yes

2. a) Any number that is "divisible by 3" has "ones digit divisible by 3."

b) No; sample counter-example: 12

3. a) The statement is false. The reverse is also false: "Any number divisible by 4 has ones digit divisible by 4."

b) The statement is true. The reverse is true: "Any number divisible by 5 has ones digit divisible by 5."

4. a) The ones digit will be 0, 2, 4, 6, or 8.

b) The ones digit will be either 5 or 0.

c) The ones digit will be 0.

5. Circle: 418, 312, 64, 76, 234, 94, 560

6. Circle: 45, 150, 190, 65, 235, 1 645

7. Underline: 150, 190

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1. Teacher to check.

2. b) 2

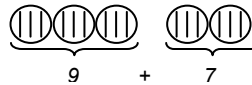
c) 2

3. Teacher to check.

4. a) Yes since $5 \times 6 = 10 \times 3$.

b) Yes.

5. a)



b) 1

c) 9 is a multiple of 3 so it will have no remainder.

d) i) 1

ii) 2

iii) 1

iv) 1

v) 2

vi) 0

6. Since $12 + 15 = 27$ is a multiple of 3.

7. a) 2 333 R 1

b) 1 666 R 2

c) 2 666 R 2

d) 666 R 2

e) 3 000 R 0

f) 1 333 R 1

8. a) 2

b) 1

9. a) Yes, since 999 is a multiple of 3.

b) 8

c) Because 999 is a multiple of 3.

d) Both 99 and 9 are divisible by 3.

10. No, it will have a remainder of 2 since 8 has a remainder of 2.

11. b) $8 + 4 = 12$ and $12 \div 3 = 4$ R 0

Check:
 $84 \div 3 = 28$ R 0

c) $4 + 7 = 11$ and $11 \div 3 = 3$ R 2

Check:
 $47 \div 3 = 15$ R 2

12. a) 5 428:
 $5 + 4 + 2 + 8 = 19$
and $19 \div 3 = 6$ R 1

5 482:
 $5 + 4 + 8 + 2 = 19$
and $19 \div 3 = 6$ R 1

2 485:
 $2 + 4 + 8 + 5 = 19$
and $19 \div 3 = 6$ R 1

b) No; any possible rearrangement will still have a sum of 19 (and therefore a remainder of 1).

13. If the sum of the digits of a number is divisible by 3, the number itself is divisible by 3.

14. a) Looking at the box on top of the page, we can see that 999, 99, 9, etc. are also multiples of 9 – so the same rule applies as for 3.

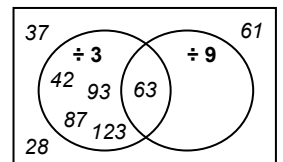
b) If the sum of the digits of a number is divisible by 9, the number itself is divisible by 9.

15. a)

28	37	42	61
10	10	6	7

63	87	93	123
9	15	12	6

b)



c) The part for numbers that are only divisible by 9 since all numbers divisible by 9 are also divisible by 3.

Number Sense – AP Book 7, Part 1: Unit 3 (continued)

16. a)

$\div 2$	$\div 2, 3$	$\div 3$
2	0	3
4	6	9
8	12	15
10	18	21
14	24	27
16	30	
20		
22		
26		
28		
- Outside the circles:
1, 5, 7, 11, 13, 17,
19, 23, 25, 29
- b) They are in the intersection part since any number divisible by both 2 and 3 will also be divisible by 6.
- c) A number is divisible by 6 if it's even and the sum of its digits is divisible by 3.
- d) Circle: 3 174, 7 314

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1. a) ii) 7; 7; 175
iii) 30; 30; 750
- b) Yes
2. b) 82; No
c) 60; Yes
d) 46; No
e) 67; No
f) 84; Yes
g) 26; No
h) 22; No
3. If the last 2 digits of a number form a number which is divisible by 4, then we can write it as a sum of a term divisible by 100 and a term divisible by 4. Sums of numbers both divisible by 4 are divisible by 4.

4. a) Yes, any number ending in 3 zeros is a multiple of 1000.
- b) If the last 3 digits of a number are divisible by 8, then we can write it as a sum of a term divisible by 1000 and a term divisible by 8. Sums of numbers both divisible by 8 are divisible by 8.
5. b) 688; Yes
c) 408; Yes
d) 546; No
e) 767; No
f) 936; Yes
6. c) 36; No
d) 600, 146; No
e) 800, 176; Yes
f) 600, 72; Yes

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1. a)

1	1
2	1, 2
3	1, 3
4	1, 2, 4
5	1, 5
6	1, 2, 3, 6
7	1, 7
8	1, 2, 4, 8
9	1, 3, 9
10	1, 2, 5, 10
11	1, 11
12	1, 2, 3, 4, 6, 12
13	1, 13
14	1, 2, 7, 14
15	1, 3, 5, 15
16	1, 2, 4, 8, 16
17	1, 17
18	1, 2, 3, 6, 9, 18
19	1, 19
20	1, 2, 4, 5, 10, 20

- b) 2, 3, 5, 7, 11, 13, 17 and 19; prime numbers
- c) 23
- d) 1, 4, 9, 16
- e) *Gaps:*
+ 5 +7 +9 +11
Pattern:
9, 16, 25, 36
- f) They are perfect squares.
- g) 121; square of 11
2. $3 + 2 + 7 + 4 = 16$ so, to be divisible by 3, $16 + x$ must be divisible by 3.
Possible values: 2, 5, 8
3. Circle: 2, 4, 5, 8, 10
4. a) Yes: $1 + 4 + 4 = 9$ and $2 + 4 + 0 = 6$ so both are divisible by 3.
b) Yes: $1 + 3 + 4 + 7 + 4 + 2 = 21$ and $1 + 2 + 3 + 4 + 6 + 9 + 8 = 33$ so both are divisible by 3.
5. a) 120
b) 264 720
6. a) Yes, it's even.
b) No, the last digit is not 0 or 5.
c) 325 or 235
d) No, the last digit is not 0.
e) No, none of the digits are 0.
7. $9 = 3^2 = \sqrt{81}$
8. a) i) and iv)
b) Answers will vary.
Sample:
i) 2 ii) 9 iii) 2
iv) 0 v) 444
9. 73 008
10. Answers will vary.
Samples:
a) $9 + 8 + 5 + 3 + 2 = 27$
So 98 532 is divisible by 9.
b) 666 660

11. In 12 days
12. 2 books (\$60)
13. 144
 $= 2 \times 2 \times 2 \times 2 \times 3 \times 3$
252
 $= 2 \times 2 \times 3 \times 3 \times 7$
GCF of 144 and 252
 $= 2 \times 2 \times 3 \times 3 = 36$
So the largest squares are 36 mm \times 36 mm.
14. a) True
b) False; 60 is a counter example

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1. a) $\frac{6}{9}$
b) $\frac{4}{6}$
c) $\frac{13}{24}$
2. a) $\frac{2}{6}$
b) $\frac{4}{6}$
c) $\frac{3}{8}$
d) $\frac{4}{9}$
3. Teacher to check.
4. 3, 7; 4
5. Teacher to check.
6. a) The total number of pieces in a pie.
b) The number of parts of the pie that are shaded in.
7. a) Yes
b) $\frac{5}{6}$
8. a) Pentagons
b) $\frac{3}{10}$
c) $\frac{2}{10}$
d) Triangles
e) $\frac{8}{10}$
f) $\frac{2}{10}$

Number Sense – AP Book 7, Part 1: Unit 3 *(continued)*

9. a) $\frac{6}{11}$
 b) $\frac{4}{11}$
 c) $\frac{1}{11}$

10. $\frac{2}{9}, \frac{7}{9}$

11. a)

	An	PI
B	7	4
G	5	7
S	12	11

b) $\frac{12}{23}, \frac{11}{23}$

c) $\frac{5}{12}, \frac{7}{12}$



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1. b) $1, \frac{3}{4}, 1\frac{3}{4}$

c) $2, \frac{1}{2}, 2\frac{1}{2}$

2. a) $4\frac{3}{5}$

b) $1\frac{7}{8}$

c) $3\frac{2}{6}$

d) $2\frac{1}{4}$

3. Teacher to check.

4. Teacher to check.

5. $4\frac{3}{4}$

6. 6

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1. a) $\frac{5}{4}$

b) $\frac{19}{8}$

c) $\frac{13}{5}$

d) $\frac{16}{6}$

e) $\frac{24}{9}$

f) $\frac{8}{3}$

g) $\frac{18}{5}$

2. Teacher to check.

3. Teacher to check.

4. $\frac{9}{3}$ because “third” sized pieces are larger than “quarter” sized pieces.

5. a) No: $5 < 7$

b) Yes: $9 > 8$

c) Yes: $13 > 11$

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1. a) $3\frac{1}{3} = \frac{10}{3}$

b) $3\frac{6}{8} = \frac{30}{8}$

c) $3\frac{2}{6} = \frac{20}{6}$

d) $2\frac{3}{4} = \frac{11}{4}$

e) $3\frac{3}{4} = \frac{15}{4}$

f) $2\frac{4}{9} = \frac{22}{9}$

2. Teacher to check shading.

a) $\frac{7}{2}$

b) $\frac{19}{4}$

3. Teacher to check shading.

a) $2\frac{1}{3}$

b) $2\frac{5}{6}$

c) $2\frac{3}{5}$

d) $2\frac{5}{8}$

4. Teacher to check pictures.

a) $3\frac{1}{2}$

b) $\frac{11}{5}$

c) $\frac{7}{3}$

d) $\frac{13}{4}$

5. You divide 5 into 13 to find out that there are 2 whole pies ($13 \div 5 = 2$ R3).

6. a) 2

b) 4

c) 8

d) 7

e) 9

f) 11

7. b) 6

c) 12

d) 4

e) 8

f) 17

8. a) 8

b) 9

c) 15

9. a) 13

b) 31

c) 47

10. a) 7

b) 11

c) 22

d) $\frac{29}{4}$

e) $\frac{45}{7}$

11. 17

12. 19

BONUS

13. 18

BONUS

14. a) 11

b) 22

15. a) 2

b) 5

c) 2

d) 3

e) 4

f) 4

16. b) 4, 1, $4\frac{1}{2}$

c) 3, 1, $3\frac{1}{3}$

d) 3, 1, $3\frac{1}{4}$

17. b) 2 R1; $2\frac{1}{6}$

c) 3 R3; $3\frac{3}{4}$

d) $1\frac{1}{2}$

e) $2\frac{2}{3}$

f) $4\frac{2}{5}$

g) $4\frac{1}{7}$

h) $7\frac{1}{8}$

i) $7\frac{5}{9}$

18. $2\frac{3}{4} = \frac{11}{4}$

19. $2\frac{3}{5} = \frac{13}{5}$

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1. b) $\frac{4}{5}$

2. a) 2; $\frac{2}{3}$ of 6 = 4

b) $\frac{1}{4}, 2; \frac{3}{4}$ of 8 = 6

c) $\frac{1}{3}, 3; \frac{2}{3}$ of 9 = 6

d) $\frac{3}{5}$ of 10 = 6

e) $\frac{3}{4}$ of 12 = 9

3. Teacher to check.

4. Teacher to check.

5. a) 6

b) 6

6. a) 3, 6

b) 2, 6

c) 5, 10

d) 5, 15

e) 9, 18

7. 12

8. 10, 5

9. $\frac{7}{12}$

10. 7

11. 8:59

12. $1\frac{5}{6}$ of a year

Number Sense – AP Book 7, Part 1: Unit 3 (continued)

BONUS

There are none left.

AP Book NS7-23

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- $\frac{6}{9}$
 - $\frac{8}{10}$
- The fraction with the greater numerator.
- $\frac{1}{2}$
 - $\frac{3}{5}$
- The greater fraction is the one with the smaller denominator.
- $\frac{1}{17}, \frac{1}{9}, \frac{1}{4}$
 - $\frac{2}{16}, \frac{2}{11}, \frac{2}{7}, \frac{2}{5}$
 - $\frac{1}{5}, \frac{3}{5}, \frac{4}{5}$
 - $\frac{1}{10}, \frac{2}{10}, \frac{5}{10}, \frac{9}{10}$
 - $\frac{5}{9}, \frac{5}{8}, \frac{7}{8}$
 - $\frac{2}{7}, \frac{3}{7}, \frac{3}{5}$

BONUS

$$\frac{6}{23}, \frac{9}{23}, \frac{9}{22}, \frac{9}{21}, \frac{11}{21}, \frac{11}{19}, \frac{15}{19}, \frac{15}{17}$$

- $\frac{9}{5}$
 - $4\frac{3}{4}$
- $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}$
 - $\frac{6}{7}$ since $\frac{1}{6} > \frac{1}{7}$
- $\frac{2}{13}; \frac{1}{15}; \frac{2}{9}; \frac{1}{20}; \frac{2}{7}; \frac{1}{13}$

9. a)	$\frac{13}{2}$	$\frac{11}{4}$	$\frac{13}{4}$
	$6\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{1}{4}$
	$\frac{11}{5}$	$\frac{11}{6}$	$\frac{13}{3}$
	$2\frac{1}{5}$	$1\frac{5}{6}$	$4\frac{1}{3}$

- $\frac{11}{6}, \frac{11}{5}, \frac{11}{4}, \frac{13}{4}, \frac{13}{3}, \frac{13}{2}$
- $1\frac{5}{6}, 2\frac{1}{5}, 2\frac{3}{4}, 3\frac{1}{4}, 4\frac{1}{3}, 6\frac{1}{2}$
- The improper and mixed fractions represent the same total amount of parts.

- Teacher to check.
- 3, since $\frac{3}{4}$ is closer to 1 than to 0.
- Teacher to check.

BONUS

$$\frac{19}{20}, \frac{14}{15}, \frac{12}{13}, \frac{11}{13}, \frac{7}{9}, \frac{5}{7}$$

Compared them by looking at the relative sizes of the numerators and denominators.

AP Book NS7-24

page 83

- =
 - <
 - =
 - <
 - >
- $\frac{2}{3} = \frac{4}{6}$ and $\frac{15}{20} = \frac{3}{4}$
- 2
 - 5
- $\frac{1}{2}, \frac{2}{4}, \frac{4}{8}$
- 2, 3, 4
 - 6
 - 9
 - 20

AP Book NS7-25

page 84

- 15
 - 8
 - 9
 - 24
 - 18
 - 50
 - 8
 - 12
 - 4, 6, 8, 10, 12, 14
 - 6, 9, 12, 15, 18, 21
 - Sample:

$$\frac{10}{15}, \frac{9}{15}$$

so $\frac{2}{3} > \frac{3}{5}$

since $10 > 9$.
 - Sample:

$$\frac{6}{9}, \frac{6}{10}$$

so $\frac{2}{3} > \frac{3}{5}$

since $9 < 10$.
 - Yes
 - 8, 12, 16, 20
 - $\frac{4}{7}, \frac{3}{5}, \frac{2}{3}$
 - $\frac{2}{5} > \frac{1}{3}$
 - $\frac{5}{6} > \frac{7}{9}$
 - $\frac{5}{8} < \frac{3}{4}$
 - $\frac{5}{8} > \frac{7}{12}$
 - $\frac{3}{5} > \frac{5}{9}$
 - $\frac{7}{12} > \frac{8}{15}$
 - 2, 3, 4, 5, 6, 7, 8, 9, 10
 - $\frac{1}{4}, \frac{1}{6}, \frac{1}{8}$
 - $\frac{5}{8}, \frac{4}{6}, \frac{3}{4}$
yes
- BONUS** $\frac{187}{372} > \frac{214}{426}$

- 9
 - 20
 - 18
 - 16
 - 21
 - 4
 - 10
- $\frac{1}{6}, \frac{3}{8}, \frac{5}{12}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}$

AP Book NS7-26

page 86

- $\frac{1}{20}$
 - Blue
 - White
- Teacher to check.
- 1
- Teacher to check.
- $\frac{1}{2}, \frac{5}{10}$
 - $\frac{16}{20}, \frac{4}{5}$
 - $\frac{2}{3}, \frac{4}{6}$
- Two of: $\frac{1}{3}, \frac{2}{6}, \frac{3}{9}$
- Five of: $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \frac{4}{8}, \frac{5}{10}, \frac{6}{12}, \frac{7}{14}, \frac{8}{16}, \frac{9}{18}, \frac{10}{20}, \frac{11}{22}$

AP Book NS7-27

page 87

- $\frac{3}{4}$
- $\frac{1}{5} + \frac{2}{5} = \frac{3}{5}; \frac{1}{3} + \frac{1}{3} = \frac{2}{3}$
- $\frac{4}{5}$
 - $\frac{3}{4}$
 - $\frac{5}{7}$
 - $\frac{7}{8}$
 - $\frac{10}{11}$

Number Sense – AP Book 7, Part 1: Unit 3 (continued)

- f) $\frac{14}{17}$
 g) $\frac{21}{24}$
 h) $\frac{31}{57}$
4. a) $\frac{2}{4}$
 b) $\frac{1}{5}$
5. a) $\frac{1}{3}$
 b) $\frac{2}{5}$
 c) $\frac{3}{7}$
 d) $\frac{3}{8}$
 e) $\frac{7}{12}$
 f) $\frac{2}{19}$
 g) $\frac{6}{28}$
 h) $\frac{5}{57}$
6. a) $\frac{6}{7}$
 b) $\frac{7}{11}$
 c) $\frac{8}{18}$

INVESTIGATION 1

- A. $\frac{5}{8} + \frac{5}{14}$; it is $\frac{5}{14}$ larger
 B. $\frac{5}{8}$; there are 5 pieces in each but “eighth” sized pieces are larger
 C. No, since – according to A and B – we know that:

$$\frac{5}{8+14} < \frac{5}{8} < \frac{5}{8} + \frac{5}{14}$$

INVESTIGATION 2

- A. 2, 3, 4, 5;
 4, 6
 B. 5, 6, 11
 C. $\frac{1}{3} + \frac{2}{5} = \frac{5}{15} + \frac{6}{15}$
 and $\frac{5}{15} + \frac{6}{15} = \frac{11}{15}$,
 so... $\frac{1}{3} + \frac{2}{5} = \frac{11}{15}$

7. b) LCD = 8; $\times 2$, $\times 1$
 c) LCD = 20; $\times 1$, $\times 4$
 d) LCD = 12; $\times 3$, $\times 4$
 e) LCD = 21; $\times 3$, $\times 7$
 f) LCD = 12; $\times 3$, $\times 2$
 g) LCD = 10; $\times 2$, $\times 1$
 h) LCD = 56; $\times 7$, $\times 8$

8. a) $\frac{13}{20}$
 b) $\frac{14}{15}$
 c) $\frac{13}{24}$
 d) $\frac{7}{12}$
 e) $\frac{7}{8}$
 f) $\frac{15}{24}$
 g) $\frac{1}{28}$
 h) $\frac{23}{56}$
 i) $\frac{5}{18}$

9. a) $\frac{7}{12}$
 b) $\frac{2}{25}$
 c) $\frac{17}{28}$
 d) $\frac{38}{45}$
 e) $\frac{1}{24}$
 f) $\frac{17}{12}$
 g) $\frac{16}{15}$
 h) $\frac{3}{15}$
 i) $\frac{10}{20}$

AP Book NS7-28 page 90

1. b) 1, yes
 c) 1, yes
 d) 5, no
 e) 2, no
 f) 1, yes
 g) 1, yes

- h) 2, no
 i) 1, yes
 j) 4, no
2. b) $\frac{1}{3}$
 c) $\frac{1}{4}$
 d) $\frac{1}{6}$
 e) $\frac{2}{3}$
 f) $\frac{1}{5}$
 g) $\frac{1}{3}$
 h) $\frac{4}{5}$
3. b) $\frac{10}{15} = \frac{2}{3}$
 c) $\frac{34}{30} = \frac{17}{15}$
 d) $\frac{21}{28} = \frac{3}{4}$
 e) $\frac{8}{10} = \frac{4}{5}$
 f) $\frac{25}{40} = \frac{5}{8}$
 g) $\frac{30}{35} = \frac{6}{7}$
 h) $\frac{21}{21} = 1$

AP Book NS7-29 page 91

1. a) $4\frac{3}{5}$
 b) $5\frac{2}{3}$
 c) $2\frac{5}{8}$
 d) $3\frac{1}{3}$
2. c) $3\frac{1}{15}$
 d) $6\frac{11}{14}$
 e) $3\frac{7}{30}$
 f) $6\frac{17}{24}$
 g) $3\frac{19}{28}$
 h) $6\frac{27}{35}$
 i) $3\frac{11}{45}$

- j) $2\frac{1}{6}$
 k) $2\frac{1}{12}$
 l) $2\frac{1}{20}$
3. $4\frac{1}{6}$
4. a) ii) $2\frac{1}{5}$
 iii) $1\frac{6}{7}$
 iv) $1\frac{3}{4}$
 v) $1\frac{5}{8}$
 vi) $1\frac{3}{10}$
 vii) $1\frac{5}{9}$
 viii) $1\frac{5}{6}$
- b) ii) $3\frac{1}{3}$
 iii) $5\frac{3}{5}$
 iv) $3\frac{1}{4}$
 v) $4\frac{1}{9}$
 vi) $5\frac{5}{7}$
- c) i) $3\frac{1}{15}$
 ii) $4\frac{1}{2}$
 iii) $7\frac{7}{20}$
 iv) $11\frac{1}{24}$
 v) $8\frac{1}{8}$
 vi) $8\frac{5}{18}$
5. a) ii) $4\frac{3}{2}$
 iii) $\frac{7}{6}$
 iv) $1\frac{7}{4}$
- b) ii) $6\frac{8}{5}$
 iii) $3\frac{7}{6}$
 iv) $1\frac{17}{10}$
- c) ii) $1\frac{11}{15}$
 iii) $\frac{7}{12}$

Number Sense – AP Book 7, Part 1: Unit 3 *(continued)*

- iv) $3\frac{3}{5}$
6. b) $\frac{8}{15}$
 c) $\frac{5}{12}$
 d) $1\frac{19}{24}$
 e) $3\frac{23}{30}$
 f) $5\frac{23}{28}$
 g) $7\frac{7}{15}$
 h) $\frac{3}{10}$
7. $2\frac{16}{21}$ km
8. $8\frac{1}{15}$ kg
9. 2 m

AP Book NS7-30

page 94

1. a) $\frac{1}{4}, 2; 2\frac{1}{4}$
 b) $\frac{2}{5}, 8, 1; 1\frac{2}{5}$
2. a) $\frac{2}{5}, 5, 1; 1\frac{2}{5}$
 b) $\frac{4}{5}, 4, 4; 4\frac{4}{5}$
 c) $\frac{3}{8}, 8, 2; 2\frac{3}{8}$
3. a) $4\frac{7}{8}$
 b) $4\frac{5}{12}$
 c) $1\frac{7}{10}$
 d) $\frac{2}{3}$
4. b) $\frac{3}{8}, 4, 4, 8, \frac{1}{8}; 4\frac{1}{2}$
5. a) $\frac{6}{7}$
 b) $4\frac{4}{9}$
 c) $4\frac{3}{5}$
 d) $6\frac{1}{3}$

AP Book NS7-31

page 95

1. a) 4
 b) 10

- c) 2
 d) 11
 e) 9, 6
 f) 8, 12
2. $\frac{8}{15}$
3. $1\frac{1}{6}$
4. $\frac{7}{15}$
5. $\frac{1}{4}$
6. a) $\frac{1}{30}$
 b) 12

7. $\frac{1}{3} \quad \frac{1}{2} \quad \frac{1}{6}$
 $\frac{1}{6} \quad \frac{1}{3} \quad \frac{1}{2}$
 $\frac{1}{2} \quad \frac{1}{6} \quad \frac{1}{3}$

8. $\frac{1}{6}$ of her money: \$11.50
9. Teacher to check.
10. Teacher to check.
11. She simply added the numerators together and the denominators together, rather than finding a common denominator first.
12. $\frac{1}{8}$
13. $7\frac{1}{2}$
14. Sadia
15. No
16. a) $\frac{13}{12}$ hr = 65 min
 b) $30 + 20 + 15 = 65$ minutes
17. a) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8}$
 b) $\frac{1}{2} + \frac{1}{3} + \frac{1}{9}$
 c) $\frac{1}{2} + \frac{1}{2} + \frac{1}{12}$ or $\frac{1}{2} + \frac{1}{3} + \frac{1}{4}$
 d) $\frac{1}{3} + \frac{1}{3} + \frac{1}{5}$

- e) $\frac{1}{3} + \frac{1}{3} + \frac{1}{15}$
18. a) True, in this case you can always divide both the numerator and denominator by 2.
 b) False; e.g. $\frac{3}{9}$
 c) False; e.g. $\frac{3}{9}$
19. No, since the whole numbers are different you don't need to consider the fraction pieces ($6 > 5$).