

Section 1.1a – Practice Questions

Emerging Level Questions

1. Consider the list of numbers: $-12, -2.7, 0, \frac{2}{3}, \pi, 4.21, 50$. **List all:**

a) Natural Numbers 50	b) Whole Numbers $0, 50$
c) Integers $-12, 0, 50$	d) Rational Numbers $-12, -2.7, 0, \frac{2}{3}, 4.21, 50$
e) Irrational Numbers π	f) Real Numbers <i>All of the numbers</i>

Proficient Level Questions

2. Consider the list of numbers: $-4, -0.3, 0, 0.121121112 \dots, 2.3535 \dots, 12, \sqrt{10}$. **List all:**

a) Natural Numbers 12	b) Whole Numbers $0, 12$
c) Integers $-4, 0, 12$	d) Rational Numbers $-4, -0.3, 2.3535, 12$
e) Irrational Numbers $\sqrt{10}, 0.121121112\dots$	f) Real Numbers <i>All of the numbers</i>

Extending Level Questions

3. Consider the list of numbers:

$-\sqrt{64}$, $\sqrt[3]{64}$, $\sqrt[3]{0.008}$, $-\sqrt{\frac{4}{9}}$, $\sqrt{0.04}$, $\sqrt{0.4}$, $\frac{0}{\sqrt{9}}$

$\sqrt[3]{\frac{8}{1000}} = \frac{2}{10}$
 $\sqrt{\frac{4}{100}} = \frac{2}{10}$
 $\sqrt{\frac{4}{10}} = \frac{2}{\sqrt{10}}$

\downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow
 -8 4 $-2/3$ 0

List all:

a) Natural Numbers $\sqrt[3]{64}$	b) Whole Numbers $\sqrt[3]{64}, \frac{0}{\sqrt{9}}$
c) Integers $-\sqrt{64}, \sqrt[3]{64}, \frac{0}{\sqrt{9}}$	d) Rational Numbers All except $\sqrt{0.4}$
e) Irrational Numbers $\sqrt{0.4}$	f) Real Numbers All of them

Emerging Level Questions

4. List every number system that the following number belongs to. (Natural, Whole, etc.)

a) $\sqrt{16}$ $\sqrt{16} = 4$ N, W, I, Rat, Real	b) π Irrational, Real
c) 0 W, I, Rat, Real	d) 2.34 Rational, Real
e) 4.010010001 ... Irrational, Real	f) $\sqrt{0.0004}$ $\sqrt{\frac{4}{10000}} = \frac{2}{1000}$ Rational, Real
g) $\sqrt{\frac{27}{12}} = \sqrt{\frac{9}{4}} = \frac{3}{2}$ Rational, Real	h) $-3.181818...$ Rational, Real

5. List each of the following:

a) Natural Numbers less than 4

1, 2, 3

b) Natural numbers greater than 5

6, 7, 8, ...

c) Whole Numbers less than 2

0, 1

d) Integers greater than -3

-2, -1, 0, 1, ...

e) Positive integers greater than -4

1, 2, 3, ...

f) Whole numbers less than 0

\emptyset ← empty set (none)

g) Non-negative integers less than 4

0, 1, 2, 3

h) Non-positive integers greater than -4

-3, -2, -1, 0

Proficient Level Questions

6. Without a calculator state whether the following numbers and how you know:

63, 126, 280, 396, 575, 2610, 7800 are divisible by:

a) 2

126, 280, 396, 2610, 7800

all even

b) 3

63, 126, 396, 2610, 7800

sum of digits is divisible by 3

c) 4

280, 396, 7800

last two digits
divisible by 4

d) 5

280, 575, 2610, 7800

Ends in 5 or 0

e) 6 126, 396, 2610, 7800
 Divisible by 2 and 3

f) 9 63, 126, 396, 2610
 sum of digits divisible by 9

g) 10
 280, 2610, 7800
 Ends in 0

7. Decide whether the number is prime or composite. If it's composite, factor it into primes.

a) 19
 Prime

b) 51
 Composite

$$\begin{array}{c} 51 \\ \wedge \\ 3 \quad 17 \end{array} \qquad 3 \cdot 17$$

c) 87
 Composite

$$\begin{array}{c} 87 \\ \wedge \\ 3 \quad 29 \end{array} \qquad 3 \cdot 29$$

d) 101
 Prime

e) 117

Composite

$$\begin{array}{c}
 117 \\
 \wedge \\
 3 \quad 39 \\
 \quad \wedge \\
 \quad 3 \quad 13
 \end{array}
 \qquad
 3 \cdot 3 \cdot 13$$

f) 199

Prime

g) 611

composite

$$\begin{array}{c}
 611 \\
 \wedge \\
 13 \quad 47
 \end{array}$$

h) 997

Prime

i) 629

Composite

$$17 \cdot 37$$

j) 551

Composite

$$19 \cdot 29$$

8. Simplify by using prime factorization and canceling out common factors

a) $\frac{385}{455}$

$$\frac{385}{455} = \frac{5 \cdot 7 \cdot 11}{5 \cdot 7 \cdot 13} = \frac{11}{13}$$

b) $\frac{1155}{1188}$

$$\frac{1155}{1188} = \frac{3 \cdot 5 \cdot 7 \cdot 11}{3 \cdot 3 \cdot 3 \cdot 2 \cdot 2 \cdot 11} = \frac{35}{36}$$

c) $\frac{1848}{2310}$

$$\frac{1848}{2310} = \frac{2 \cdot 2 \cdot 2 \cdot 3 \cdot 7 \cdot 11}{2 \cdot 3 \cdot 5 \cdot 7 \cdot 11} = \frac{4}{5}$$

d) $\frac{4950}{5775}$

$$\frac{4950}{5775} = \frac{2 \cdot 3 \cdot 3 \cdot 5 \cdot 5 \cdot 11}{3 \cdot 3 \cdot 5 \cdot 7 \cdot 11} = \frac{6}{7}$$

9. Completely factor each number into a product of primes.

a)

$$\begin{array}{c}
 36 \\
 \wedge \\
 6 \quad 6 \\
 \wedge \quad \wedge \\
 2 \quad 3 \quad 2 \quad 3 \\
 \\
 2 \cdot 2 \cdot 3 \cdot 3
 \end{array}$$

b)

$$\begin{array}{c}
 78 \\
 \wedge \\
 2 \quad 39 \\
 \quad \quad \wedge \\
 \quad \quad 3 \quad 13 \\
 \\
 2 \cdot 3 \cdot 13
 \end{array}$$

c)

$$\begin{array}{c}
 84 \\
 \wedge \\
 4 \quad 21 \\
 \wedge \quad \wedge \\
 2 \quad 2 \quad 3 \quad 7 \\
 \\
 2 \cdot 2 \cdot 3 \cdot 7
 \end{array}$$

d)

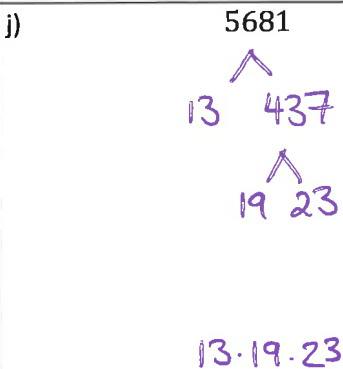
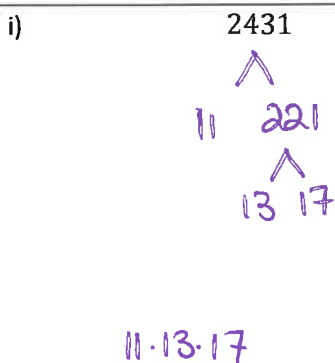
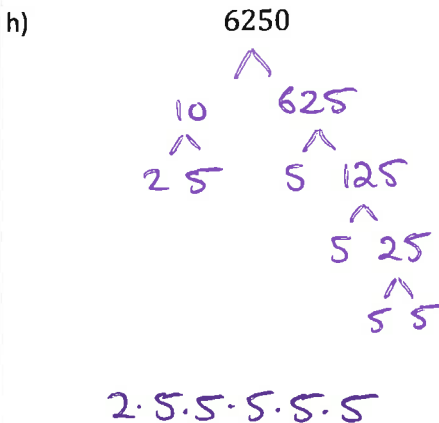
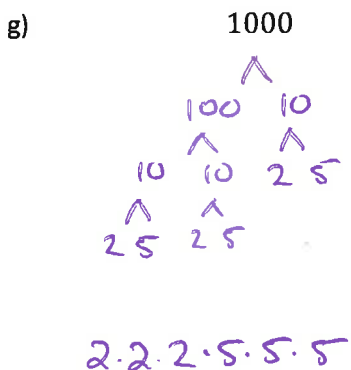
$$\begin{array}{c}
 169 \\
 \wedge \\
 13 \quad 13 \\
 \\
 13 \cdot 13
 \end{array}$$

e)

$$\begin{array}{c}
 178 \\
 \wedge \\
 2 \quad 89 \\
 \\
 2 \cdot 89
 \end{array}$$

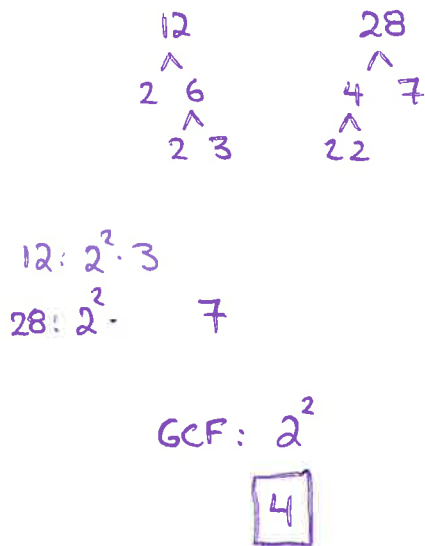
f)

$$\begin{array}{c}
 425 \\
 \wedge \\
 5 \quad 85 \\
 \quad \quad \wedge \\
 \quad \quad 5 \quad 17 \\
 \\
 5 \cdot 5 \cdot 17
 \end{array}$$

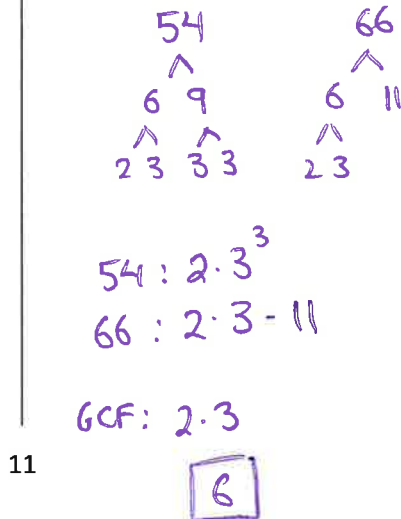


10. Find the Greatest Common Factor of the following numbers.

a) 12, 28



b) 54, 66



c) 48, 136

$$\begin{array}{c}
 48 \\
 \wedge \\
 6 \quad 8 \\
 \wedge \quad \wedge \\
 2 \quad 3 \quad 4 \quad 2 \\
 \quad \quad \wedge \\
 \quad \quad 2 \quad 2
 \end{array}$$

$$\begin{array}{c}
 136 \\
 \wedge \\
 2 \quad 68 \\
 \quad \quad \wedge \\
 \quad \quad 2 \quad 34 \\
 \quad \quad \quad \quad \wedge \\
 \quad \quad \quad \quad 2 \quad 17
 \end{array}$$

$48: 2^4 \cdot 3$
 $136: 2^3 \cdot 17$

GCF: 2^3

8

d) 65, 169

$$\begin{array}{c}
 65 \\
 \wedge \\
 5 \quad 13
 \end{array}$$

$$\begin{array}{c}
 169 \\
 \wedge \\
 13 \quad 13
 \end{array}$$

GCF: **13**

e) 81, 108

$81: 3^4$
 $108: 2^2 \cdot 3^3$

$$\begin{array}{c}
 81 \\
 \wedge \\
 9 \quad 9 \\
 \wedge \quad \wedge \\
 3 \quad 3 \quad 3 \quad 3
 \end{array}$$

$$\begin{array}{c}
 108 \\
 \wedge \\
 2 \quad 54 \\
 \quad \quad \wedge \\
 \quad \quad 2 \quad 27 \\
 \quad \quad \quad \quad \wedge \\
 \quad \quad \quad \quad 3 \quad 9 \\
 \quad \quad \quad \quad \quad \quad \wedge \\
 \quad \quad \quad \quad \quad \quad 3 \quad 3
 \end{array}$$

GCF: 3^3

27

f) 30, 45, 60

$$\begin{array}{c}
 30 \\
 \wedge \\
 3 \quad 10 \\
 \quad \quad \wedge \\
 \quad \quad 2 \quad 5
 \end{array}$$

$$\begin{array}{c}
 45 \\
 \wedge \\
 5 \quad 9 \\
 \quad \quad \wedge \\
 \quad \quad 3 \quad 3
 \end{array}$$

$$\begin{array}{c}
 60 \\
 \wedge \\
 6 \quad 10 \\
 \wedge \quad \wedge \\
 2 \quad 3 \quad 2 \quad 5
 \end{array}$$

$30: 2 \cdot 3 \cdot 5$
 $45: 3^2 \cdot 5$
 $60: 2^2 \cdot 3 \cdot 5$

GCF: $3 \cdot 5$

15

Extending Level Questions

11. Find the Lowest Common Multiple of the following numbers.

a) 7, 11, 13

7
 11
 13

LCM: $7 \cdot 11 \cdot 13$

1001

b) 28, 35, 42

$$\begin{array}{c}
 28 \\
 \wedge \\
 4 \quad 7 \\
 \wedge \\
 2 \quad 2
 \end{array}$$

$$\begin{array}{c}
 35 \\
 \wedge \\
 5 \quad 7
 \end{array}$$

$$\begin{array}{c}
 42 \\
 \wedge \\
 6 \quad 7 \\
 \wedge \\
 2 \quad 3
 \end{array}$$

$28: 2^2 \cdot 7$
 $35: 5 \cdot 7$
 $42: 2 \cdot 3 \cdot 7$

LCM: $2^2 \cdot 3 \cdot 5 \cdot 7$

420

c) 22, 33, 66

$$\begin{aligned} 22 &: 2 \cdot 11 \\ 33 &: 3 \cdot 11 \\ 66 &: 2 \cdot 3 \cdot 11 \end{aligned}$$

$$\text{LCM} = 2 \cdot 3 \cdot 11$$

$$\boxed{66}$$

d) 4, 36, 225

$$\begin{aligned} 4 &: 2^2 \\ 36 &: 2^2 \cdot 3^2 \\ 225 &: 3^2 \cdot 5^2 \end{aligned}$$

$$\text{LCM} = 2^2 \cdot 3^2 \cdot 5^2$$

$$\boxed{900}$$

e) 8, 27, 125

$$\begin{aligned} 8 &: 2^3 \\ 9 &: 3^2 \\ 125 &: 5^3 \end{aligned}$$

$$\text{LCM} = 2^3 \cdot 3^3 \cdot 5^3$$

$$\boxed{27\,000}$$

f) 14, 84, 98

$$\begin{aligned} 14 &: 2 \cdot 7 \\ 84 &: 2^2 \cdot 3 \cdot 7 \\ 98 &: 2 \cdot 7^2 \end{aligned}$$

$$\text{LCM} = 2^2 \cdot 3 \cdot 7^2$$

$$\boxed{588}$$