**F.3 Mathematics – Supplementary Worksheet for NCM 3A Chapter 1**

**Solutions**

**Level 1**

1. (a) 5–3 ÷ 5–5 × 50

= 5–3 ÷ 5–5

= 5–3 – (–5)

= 52

= 25

(b) (2–3 ÷ 20)–2

= (2–3)–2

= 2(–3) × (–2)

= 26

= 64

(c) 

=

= 6–3 – (–4) – 1

= 61 – 1

= 5

2. (a) 4–3 ÷ 2–5

= (22)–3 ÷ 2–5

= 22 × (–3) ÷ 2–5

= 2–6 ÷ 2–5

= 2–6 – (–5)

= 2–1

=

(b) 

=

=

=

=

= –1

(c) 

=

=

=

=

=

3. (a) *a*–7 × *a*3 ÷ *a*–5

= *a*–7 + 3 – (–5)

= *a*

(b) 

= (*b*4)–2

= *b*4 × (–2)

= *b*–8

=

(c) (*m*–3 *n*2)–1

= (*m*–3)–1(*n*2)–1

= *m*(–3) × (–1) *n*2 × (–1)

= *m*3 *n*–2

=

4. (a) (–3*a*–2*b*)–3

= (–3)–3 *a*(–2) × (–3) *b*–3

=

=

(b) (2–2 *x*4 *y*–3)–1

= 2(–2) × (–1) *x*4 × (–1) *y*(–3) × (–1)

= 22 *x*–4 *y*3

=

(c) 

=

=

=

5. (a) 7.4 × 108 – 9.1 × 106

= 730 900 000

= 7.309 × 108

(b) (5.6 × 10–8) × (1.5 × 105)

= 0.008 4

= 8.4 × 10–3

(c) (2.5 × 103) ÷ (3.2 × 10–4)

= 7 812 500

= 7.812 × 106

6. Weight of each molecule of the chemical *K*

= 72.4 ÷ (8 × 1035) g

= 9.05 × 10–35 g

7. Distance that sound travels in half an hour

= 332 × 60 × 30 m

= 597 600 m

= 597.6 km

Speed of train

= 597.6 ÷ 5 km/h

= 120 km/h, *cor. to 2 sig. fig.*

= 1.2 × 102 km/h

8. (a) (i) 10012

= 1 × 23 + 0 × 22 + 0 × 2 + 1 × 1

(ii) 11001112

= 1 × 26 + 1 × 25 + 0 × 24 + 0 × 23 + 1 × 22 + 1 × 2 + 1 × 1

(b) (i) 4B16

= 4 × 16 + 11 × 1

(ii) C0116

= 12 × 162 + 0 × 16 + 1 × 1

9. (a) 2 15

2 7 …… 1

2 3 …… 1

1 …… 1

∴ 1510 = 11112

(b) 16 172

10 …… 12

∴ 17210 = AC16

**Level 2**

1. (a) 16–1 × (4–2)–1 ÷ (2–5)0

= (42)–1 × 4(–2) × (–1) ÷ 1

= 4–2 × 42

= 4–2 + 2

= 40

= 1

(b) 3–4 × 123 ÷ (–36)–2

= 3–4 × (4 × 3)3 ÷ (–4 × 32)–2

= 3–4 × 43 × 33 ÷ [(–4)–2 × 32 × (–2)]

= 3–4 × 43 × 33 ÷ [4–2 × 3–4]

= 3–4 + 3 – (–4) × 43 – (–2)

= 33 × 45

= 27 648

(c) 53 – (–5)–2 × (20–1)–2

= 53 – 5–2 × 20(–1) × (–2)

= 53 – 5–2 × 202

= 53 – 5–2 × (4 × 5)2

= 53 – 5–2 × 42 × 52

= 53 – 42

= 125 – 16

= 109

2. (a) 

=

=

=

=

= *a*–7*b*2

=

(b) 

=

=

=

=2–3 *m*–6 *n*5

=

(c) (*x*5*y*–2)–3(*x*–2*y*)–2

= *x*5 × (–3) *y*(–2) × (–3) *x*(–2) × (–2) *y*–2

= *x*–15 *y*6 *x*4 *y*–2

= *x*–15 + 4 *y*6 – 2

= *x*–11 *y*4

=

3. (a) 

=

=

=

=

= 25 × 103

= 2.5 × 104

(b) 

=

=

= 6 × 10–21

4. Area of the island

= 2.75 × 105 × 4.05 × 103 × 104 cm2

= 2.75 × 4.05 × 105 + 3 + 4 cm2

= 11.1375 × 1012 cm2

= 1.11375 × 1013 cm2

= 1.11 × 1013 cm2, *cor. to 3 sig. fig.*

5. (a) Volume of water

= 1.35 km3

= 1.35 × 103 × 103 × 103 m3

= 1.35 × 103 + 3 + 3 m3

= 1.35 × 109 m3

(b) 1.35 × 109 ÷ (2.7 × 106)

= (1.35 ÷ 2.7) × 109 – 6

= 0.5 × 103

= 500

∴ It will take 500 days to empty the reservoir.

6. Distance between the two planets

=× 9.5 × 1012

= 5 × 109 km

1 year = 365 days

= 365 × 24 h

= 365 × 24 × 60 min

= 365 × 24 × 60 × 60 s

= 3.153 6 × 107 s

Distance that spacecraft travelled in 1 year

= 1.6 × 104 × 3.153 6 × 107 m

= 5.045 76 × 1011 m

= 5.045 76 × 1011 × 10–3 km

= 5.045 76 × 108 km

The required time

= 5 × 109 ÷ 5.045 76 × 108 years

= 0.991 × 10 years, *cor. to 3 sig. fig.*

= 9.91 years

∴ It will take 9.91 years to reach planet *B*.

7. (a) The smallest number is 1000112.

(b) The largest number is 1110002.

(c) 1000112 = 1 × 25 + 1 × 2 + 1 × 1

= 32 + 2 + 1

= 3510

1110002 = 1 × 25 + 1 × 24 + 1 × 23

= 32 + 16 + 8

= 5610

The difference = 56 – 35

= 21

8. (a) 7C16

= 7 × 16 + 12 × 1

= 112 + 12

= 12410

2 124

2 62 …… 0

2 31 …… 0

2 15 …… 1

2 7 …… 1

2 3 …… 1

1 …… 1

∴ 12410 = 11111002

∴ 7C16 = 11111002

(b) 111001012

= 1 × 27 + 1 × 26 + 1 × 25 + 1 × 22 + 1 × 1

= 128 + 64 + 32 + 4 + 1

= 22910

16 229

14 …… 5

∴ 22910 = E516

∴ 111001012 = E516