**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