

**Section 1, Areas**

**Exercise 2.1**

1.
  - a.  $3 \times 3 = 9$  sq in
  - b.  $5 \times 4 = 20$  sq ft
  - c.  $\frac{1}{2}4 \times 11 = 22$  sq in
  - d.  $r = 4.5$  in  
 $3.142 \times 4.5^2 = 63.6$  sq in
  - e.  $4.5 \times 2.3 = 10.35$  sq ft
2. 216 sq in
3. 150.82 sq ft



**Exercise 2.2**

1. 36 squares
2. 49 squares
3. 55 whole squares + 11 part squares = 60.5 squares
4. 92 whole squares + 18 part squares = 101 squares
5. 52 whole squares + 31 part squares = 67.5 squares



**Exercise 2.3**

- a. 50 squares
- b. 24 squares
- c. 34 whole squares + 25 part squares = 36.5 squares
- d. 40 whole squares + 34 part squares = 57 squares



**Example 2.4**

- a.  $8 \times 4 = 32$  squares
- b.  $12 \times 8 = 96$  squares
- c.  $6 \times 8 = 48$  squares



**Exercise 2.5**

1.  $4 \times 3 = 12$  sq in
2.  $11 \times 2 = 22$  sq in
3.  $2 \times 1 = 2$  sq miles



**Exercise 2.6**

1.  $2 \times 1 = 2$  sq ft                       $24 \times 12 = 288$  sq in
2.  $1 \times 1 = 1$  sq ft                         $12 \times 12 = 144$  sq in
3.  $4.583 \times 3.75 = 17.19$  sq ft         $55 \times 45 = 2,475$  sq in



Exercise 2.7

1.
  - a)  $4 \times 4 = 16 \text{ sq in}$
  - b)  $5 \times 5 = 25 \text{ sq in}$
  - c)  $1 \times 1 = 1 \text{ sq ft}$
2.
  - a)  $1 \times 2 = 2 \text{ sq in}$
  - b)  $3 \times 3 = 9 \text{ sq in}$
  - c)  $6 \times 3 = 18 \text{ sq in}$
  - d)  $3.417 \times 5 = 17.1 \text{ sq ft}$
  - or  $41 \times 60 = 2,460 \text{ sq in}$



Exercise 2.8

1. 9 sq in
2. 18 sq in
3. 36 sq in



Exercise 2.9

1.
  - a)  $12 \times 5 = 60 \text{ sq in}$
  - b)  $22.5 \times 4 = 90 \text{ sq in}$
  - c)  $3 \times 10 = 30 \text{ sq ft}$
  - d)  $2 \times 8 = 16 \text{ sq ft}$
2.
  - a) 20 sq in
  - b) 168 sq in
  - c) 328 sq in
3. 30.25 sq in
4. 864 sq in
5.
  - a) 20sq yards x £9.99 = £199.80
  - b) 20 sq yards x £18.75 = £375.00



Exercise 2.10

1.
  - a) 6 sq in
  - b) 60 sq in
  - c) 24 sq in
2.
 

small sail	=	100 sq ft
large sail	=	150 sq ft
3. 110.5 sq ft



Exercise 2.11

1.  $6 \times 2 = 12 \text{ sq in}$
2.  $3 \times 4 = 12 \text{ sq in}$
3.  $20 \times 2 = 40 \text{ sq ft}$



Exercise 2.12

1. 3.5 sq in
2. 9 sq ft
3. 29 sq ft



Exercise 2.13

1.
  - a) 254.5 sq in
  - b) 12.57 sq in
  - c) 50.24 sq ft
  - d) 19.63 sq in
  - e) 314 sq in
2. 78.5 sq in
3. 706 sq ft



Exercise 2.14

1. 12 in
2. 20 in
3. 20 in



Exercise 2.15

1. 446 sq ft
2.
  - a) 5.6 litres
  - b) 11.2 litres



Exercise 2.16

1. 314.1 sq ft



**Section 2, Area Volumes**

**Exercise 2,17**

1. a) 84 cu in  
b) 22 cu ft
2. 160 cu ft
3. 356.2 cu ft



**Exercise 2.18**

6. 800 cu ft
7. 720 cu ft
8. a) 378 cu ft  
b) 8 ft deep  
c) 12 ft long



**Exercise 2.19**

1. 339.12 cu ft
2. 188.4 cu ft



**Section 3, Oilfield Volumes**

**Exercise 2.20**

1.
  - a. 128 bbl
  - b. 16 bbl/ft
2.
  - a. 33.6 bbl
  - b. 2.24 bbl/ft
3.
  - a. 0.0155 bbl/ft
  - b. 0.0731 bbl/ft
  - c. 0.0087 bbl/ft
4.
  - a. 0.0836 bbl/ft
  - b. 0.0459 bbl/ft
  - c. 0.125 bbl/ft



**Exercise 2.21**

1.
  - a. 39.25 cu ft
  - b. 6.99 bbl
2. 140 bbl



**Exercise 2.22**

1.
  - a. 356.2 bbl
  - b. 17.81 bbl/ft
  - c. 213.72 bbl
  - d. 124.67 bbl
  - e. 17 ft
2. 14.97 ft
3.
  - a. 153.9 bbl
  - b. 188.1 bbl
  - c. 34 bbl



**Exercise 2.23**

1. 26.87 bbl
2. 2.25 bbl/ft
3.
  - a. 4.5 bbl
  - b. 6.75 bbl
  - c. 24.75 bbl



Exercise 2.24

1. a. 0.01554 bbl/ft  
b. 15.54 bbl
2. a. 0.03457 bbl/ft  
b. 311.1 bbl
3. a. 0.1497 bbl/ft  
b. 1048.1 bbl
4. a. 0.14578 bbl/ft  
b. 510.3 bbl
5. a. 0.07019 bbl/ft  
b. 203.6 bbl



Exercise 2.25

1. a) Annular capacity 0.0558 bbl/ft  
b) Volume of mud 279 bbl
2. a) Annular capacity 0.0226 bbl/ft  
b) Volume of mud 52.9 bbl
3. a) Annular capacity 0.273 bbl/ft  
b) Volume of mud 2,457 bbl
4. a) Annular capacity 0.235 bbl/ft  
b) Volume of mud 129 bbl
5. a) Annular capacity 0.0596 bbl/ft  
b) Volume of mud 298 bbl



Exercise 2.26



1.
  - a. 0.01776 bbl/ft
  - b. 0.0087 bbl/ft
  - c. 0.0346 bbl/ft
  - d. 0.1458 bbl/ft
  - e. 0.0702 bbl/ft
  - f. 0.1562 bbl/ft
  - g. 0.3062 bbl/ft
  - h. 0.0087 bbl/ft
2.
  - a. 266.4 bbl
  - b. 604.9 bbl
  - c. 1,338.8 bbl
  - e. 7.3 bbl
  - e. 4.8 bbl
3.
  - a. 0.2975 bbl/ft
  - b. 0.0836 bbl/ft
  - c. 0.1215 bbl/ft
  - d. 0.0226 bbl/ft
  - e. 0.0558 bbl/ft
  - f. 0.0489 bbl/ft
  - g. 0.0252 bbl/ft
4.
  - a. 243 bbl
  - b. 1,378.6 bbl
  - c. 205.6 bbl
  - d. 273.1 bbl
  - e. 967.6 bbl

**Section 4, Borehole Geometry, Surface BOP**

Exercise 2.27

1. 1,386.0 bbl
2. 187.6 bbl



Exercise 2.28

1.
  - a. 26 in
  - b. 20 in
2.
  - a.  $13\frac{3}{8}$  in
  - b.  $9\frac{5}{8}$  in
  - c. 7 in



Exercise 2.29

1. Drill pipe 8,900 ft
4. Drill collars 1,000 ft
3. Hole depth 15,500 ft
4. Drill pipe 20,669 ft



Exercise 2.30

	Length	Capacity	Volume
Drill pipe	10,620	0.0129 bbl/ft	137 bbl
HWDP	800	0.0049 bbl/ft	3.9 bbl
Drill collars	930	0.0038 bbl/ft	<u>3.6 bbl</u>
Total volume of drill string		=	144.5 bbl



Exercise 2.31

Section 1 Drill pipe in casing annulus  
5,000 ft

Section 2 Drill pipe in open hole  
Drill pipe = 10,009 ft  
HWDP = 651 ft  
Total = 10,660 ft

Section 3 Drill collars in open hole  
790 ft





Exercise 2.32

1.   a.    144 bbl  
      b.    1054.5 bbl
  
2.   a.    85.4 bbl  
      b.    1,453 bbl  
      c.    1,538.4 bbl
  
3.   a.    196.0 bbl  
      b.    681.8 bbl  
      c.    877.8 bbl



**Section 5, Borehole Geometry Subsea BOP**

Exercise 2.33

1. 163.1 bbl
2. 1,156.7 bbl



Exercise 2.34

1.
  - a. 219.3 bbl
  - b. 521.9 bbl
  - c. 741.2 bbl
  - d. 816 bbl
2.
  - a. 139.5 bbl
  - b. 993.1 bbl
  - c. 1,132.6 bbl
  - d. 127.5 bbl



**Section 6, Pump Output and Strokes**

**Exercise 2.35**

1. 1,318 strokes
2. 9,862 strokes
3. 1,1180 strokes
4. 373 minutes



**Exercise 2.36**

1.
  - a. 0.1429 bbl/stroke
  - b. 0.1400 bbl/stroke
  - c. 0.1372 bbl/stroke
2.
  - a. 0.1223 bbl/stroke
  - b. 0.119 bbl/stroke



**Exercise 2.37**

1. 1,087 strokes
2. 1,439 strokes
3. 6,606 strokes
4. 696 strokes
5. 9,061 strokes



**Exercise 2.38**

1. 60 min
2. 32 min
3. 30 min
4. 77 min
5. 8 min



**Exercise 2.39**

1. 1,267 strokes
2. 32 min
3. 9,032 strokes
4. 226 min
5. 10,299 strokes



Exercise 2.40

1. 164.8 bbl
2. 480 bbl
3. 644.8 bbl
4. 1,385 strokes
5. 4,034 strokes
6. 5,419 strokes
7. 181 min



**Section 7, Kill Sheet Calculations**

Exercise 2.41

1. 1,374 strokes
2. 4,003 strokes
3. 5,377 strokes
4. 134 minutes



Exercise 2.42

1. 1,218 strokes
2. 41 minutes
3. 1,246.7 bbl
4. 1,392.8 bbl
5. 387 minutes



**Section 8, Trip Monitoring Calculations**

**Exercise 2.43**

120.5 bbl



**Exercise 2.44**

1. a
2. b



**Exercise 2.45**

	OD (in)	ID (in)	Metal displacement (bbl/ft)
1	3 <sup>1</sup> / <sub>2</sub>	2.764	0.0045
2	5	4.214	0.0070
3	5	3	0.0155
4	4	3.34	0.0047
5	6 <sup>5</sup> / <sub>8</sub>	5.965	0.0081
6	13 <sup>3</sup> / <sub>8</sub>	12.415	0.0241



**Exercise 2.46**

	Metal displacement bbl/ft	Length of pipe feet	Total metal displacement bbl
1	0.0155	1,200	18.6
2	0.0545	850	46.3
3	0.0045	7,050	31.7
4	0.079	500	39.5
5	0.0087	5,450	47.4



Exercise 2.47

1. 80.5 bbl
2. 88.6 bbl



Exercise 2.48

	OD (in)	Closed end displacement (bbl/ft)
1	5	0.0243
2	5 <sup>1</sup> / <sub>2</sub>	0.0294
3	6 <sup>1</sup> / <sub>4</sub>	0.0379
4	9 <sup>1</sup> / <sub>2</sub>	0.0877
5	9 <sup>5</sup> / <sub>8</sub>	0.09



Exercise 2.49

1. 5 bbl
2. 5 bbl
3. 282 feet

