Section 1, Areas

Exercise 2.1

1. a.   3 x 3   =   9 sq in
    b.   5 x 4   =   20 sq ft
    c. $\frac{1}{2}4 \times 11$ =   22 sq in
    d.   r = 4.5 in
         3.142 x 4.5^2 =   63.6 sq in
    e.   4.5 x 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 x 4   =   32 squares
b. 12 x 8 =   96 squares
c. 6 x 8   =   48 squares

Exercise 2.5

1. 4 x 3   =   12 sq in
2. 11 x 2 =   22 sq in
3. 2 x 1   =   2 sq miles

Exercise 2.6

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

Exercise 2.7

1.	a)	4 x 4	=	16 sq in	✔
	b)	5 x 5	=	25 sq in	
	c)	1 x 1	=	1 sq ft	
2.	a)	1 x 2	=	2 sq in	
	b)	3 x 3	=	9 sq in	
	c)	6 x 3	=	18 sq in	
	d)	3.417 x 5	=	17.1 sq ft	
	or	41 x 60	=	2,460 sq in	

Exercise 2.8

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

Exercise 2.9

1.	a)	12 x 5	=	60 sq in
	b)	22.5 x 4	=	90 sq in
	c)	3 x 10	=	30 sq ft
	d)	2 x 8	=	16 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)	20 sq 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 x 2	=	12 sq in
2.	3 x 4	=	12 sq in
3.	20 x 2	=	40 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. $13^3/_8$ in
    b. $9^5/_8$ 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	3.6 bbl

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	$3^1/_2$	2.764	0.0045
2	5	4.214	0.0070
3	5	3	0.0155
4	4	3.34	0.0047
5	$6^5/_8$	5.965	0.0081
6	$13^3/_8$	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	$5^1/_2$	0.0294
3	$6^1/_4$	0.0379
4	$9^1/_2$	0.0877
5	$9^5/_8$	0.09

Exercise 2.49

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