

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 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

