Problem 5.1

Given: Pumping well in confined aquifer

T = 1589 sq ft/d

S = 0.0005

Q = 325 gpm 62567 cu ft/d

t = 30 d

Find: Drawdown at r = 50, 150, 250, 500, 1000, 3000, 6000, and 10000 ft.

10 10 10

r (ft)	u	W(u)	h_o-h (ft)	C-J
50	6.56E-06	11.36	35.59	35.55
150	5.90E-05	9.16	28.70	28.68
250	1.64E-04	8.14	25.50	25.48
500	6.56E-04	6.75	21.16	21.14
1000	2.62E-03	5.37	16.82	16.80
3000	2.36E-02	3.19	10.00	9.93
6000	9.44E-02	1.88	5.88	5.59
10000	2.62E-01	1.01	3.16	2.39
1	2.62E-09	19.18	60.10	60.04

$$h_o - h(r,t) = \frac{Q}{4\pi T} W(u)$$

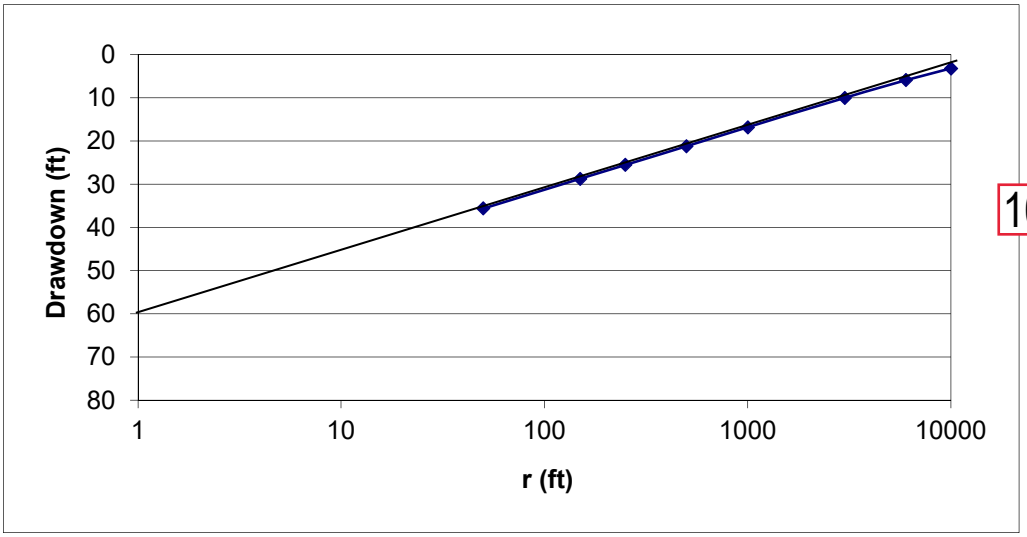
$$u = \frac{r^2 S}{4Tt}$$

$$h_o - h(r,t) = \frac{2.3\,Q}{4\pi T} \log \frac{2.25\,T\,t}{r^2 S}$$

30 total

Problem 5.3

Plot the results of 5.1 on semilog axes.



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Problem 5.4

Given: Well in Problem 1 has radius of 1 ft. Observed drawdown is 87 ft.

Find: Efficiency of well.

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See final line of table in Problem 1.

Theoretical ho-h (ft) = 60.10

Efficiency = 100 (theoretical ho-h (ft)/observed ho-h (ft)) =100 (60.1 ft/87 ft)

= 69.1

Problem 5.7

Given: Confined aquifer in Problem 1 is overlain with a leaky aquitard.

b' = 13.7 ft

K' = 0.13 ft/d

Find: Drawdowns at same r values as Problem 1.

B = 409 ft

$$h_o - h(r,t) = \frac{Q}{4\pi T} W\left(u, \frac{r}{B}\right)$$

$$B = \left(\frac{T\,b'}{K'}\right)^{1/2}$$

$$u = \frac{r^2 S}{4Tt}$$

10 10

r (ft)	u	r/B	W(u, r/B)	h_o-h (ft)
50	6.56E-06	0.12	4.58	14.35
150	5.90E-05	0.37	2.42	7.58
250	1.64E-04	0.61	1.53	4.79
500	6.56E-04	1.22	0.707	2.22
1000	2.62E-03	2.44	0.183	0.57
3000	2.36E-02	7.33	0.001	0.00
6000	9.44E-02	14.66	0.000	0.00
10000	2.62E-01	24.44	0.000	0.00

20 total

Problem 5.9

Given: Aquifer and well in Problem 1.

Find: Drawdown at 1, 2, 5, 10, 15, 30, 60 min, 2, 5, 12 hr, 1, 5, 10, 20, 30 d.

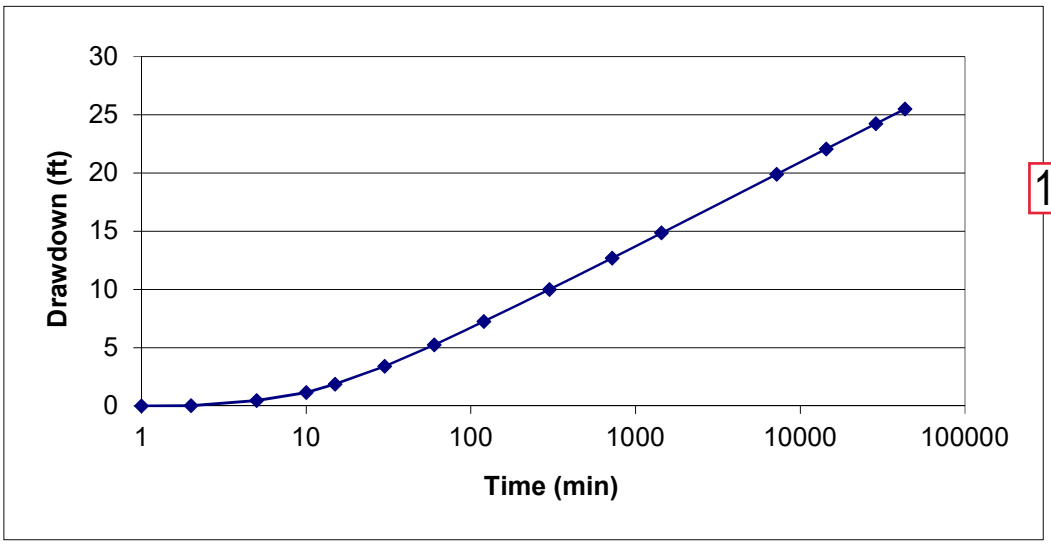
at r = 250 ft

10 10 10

t (min)	t (d)	u	W(u)	h_o-h (ft)		C-J
1	6.94E-04	7.08E+00	0.00	0.00	Table	-7.93
2	1.39E-03	3.54E+00	0.01	0.03	Table	-5.76
5	3.47E-03	1.42E+00	0.15	0.47	Table	-2.89
10	6.94E-03	7.08E-01	0.37	1.15	Equation	-0.72
15	1.04E-02	4.72E-01	0.60	1.87		0.55
30	2.08E-02	2.36E-01	1.09	3.41		2.72
60	4.17E-02	1.18E-01	1.67	5.25		4.89
120	8.33E-02	5.90E-02	2.31	7.24		7.06
300	2.08E-01	2.36E-02	3.19	10.00		9.93
720	0.5	9.83E-03	4.05	12.70		12.67
1440	1	4.92E-03	4.74	14.86		14.83
7200	5	9.83E-04	6.35	19.89		19.87
14400	10	4.92E-04	7.04	22.06		22.04
28800	20	2.46E-04	7.73	24.23		24.21
43200	30	1.64E-04	8.14	25.50		25.48

Problem 5.11

Plot results of 5.9 on semilog graph.



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5-13| Given: Confined Aquifer, $b = 18\,ft$
Well $Q = 78000\,ft^3/d$ at equilibrium
$h_1 = 277\,ft$ @ $r_1 = 125\,ft$
$h_2 = 291\,ft$ @ $r_2 = 305\,ft$

Find: T

$$h_2 - h_1 = \frac{Q}{2\pi \underbrace{Kb}_{T}} \ln \frac{r_2}{r_1}$$

$$T = \frac{Q}{2\pi (h_2 - h_1)} \ln \frac{r_2}{r_1}$$

$$= \frac{78000\,ft^3/d}{2\pi (291\,ft - 277\,ft)} \ln \frac{305\,ft}{125\,ft}$$

$$\boxed{T = 997\,ft^2/d}$$

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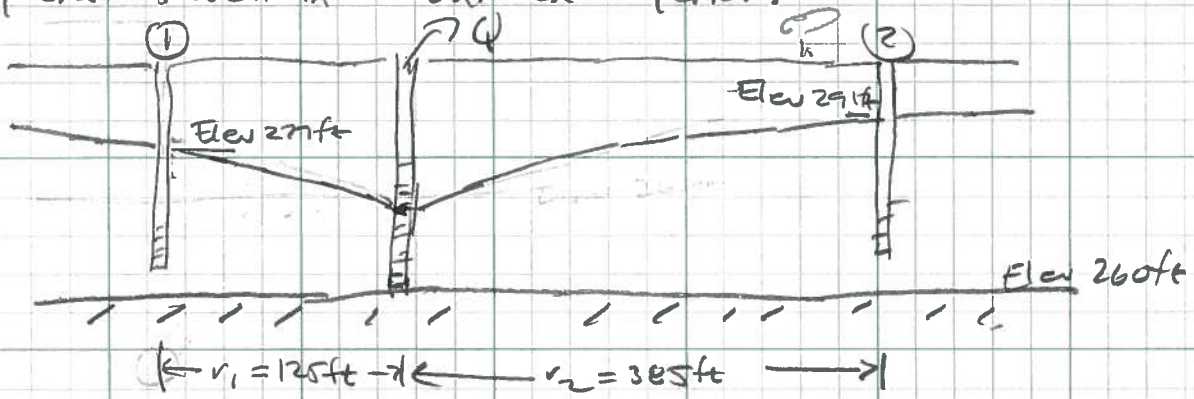
S.14 Given: Well in unconfined aquifer.



$Q = 78000\ ft^3/d$ at Equilibrium

Find: K

$$h_2^2 - h_1^2 = \frac{Q}{\pi K} \ln \frac{r_2}{r_1}$$

$h_1 = 277\ ft - 260\ ft = 17\ ft$

$h_2 = 291\ ft - 260\ ft = 31\ ft$

$$K = \frac{Q}{\pi (h_2^2 - h_1^2)} \ln \frac{r_2}{r_1}$$

$$= \frac{78000\ ft^3/d}{\pi \left([31ft]^2 - [17ft]^2\right)} \ln \frac{385\ ft}{125\ ft}$$

$$\boxed{K = 42\ ft/d}$$