REVIEW

330. Formation of a skin around a wellbore depends upon how the well is _____, _____, and _____.

331. As the well is drilled, a skin may be formed by the _____ _____.

332. When the well is completed, a string of _____ is cemented into place.

333. The reduction of permeability near the wellbore by drilling mud, cement, or rock particles is called the _____ effect.

PRODUCTIVITY INDEX AND INFLOW PERFORMANCE

334. The flowing bottomhole pressure is usually designated by the symbol P_{wf}.

In the symbol P_{wf}, "P" stands for pressure, "$_w$" stands for well, and "$_f$" stands for _____.

335. In the same way, the shut-in or static, bottomhole pressure is designated P_{ws}.

In this symbol, the "$_s$" stands for _____.

336. In order for a well to produce, P_{wf} must be (greater than / less than) P_{ws}.

337. If P_{ws} and P_{wf} are equal, no fluid can _____ into the wellbore.

338. Production stops because there is no pressure _____ between the reservoir and the wellbore.

339. The difference between P_{ws} and P_{wf} is called the *pressure drawdown* of the well.

That is, if $P_{wf} = 1000$ PSI and P_{ws} is 1700 PSI, the drawdown is _____ PSI.

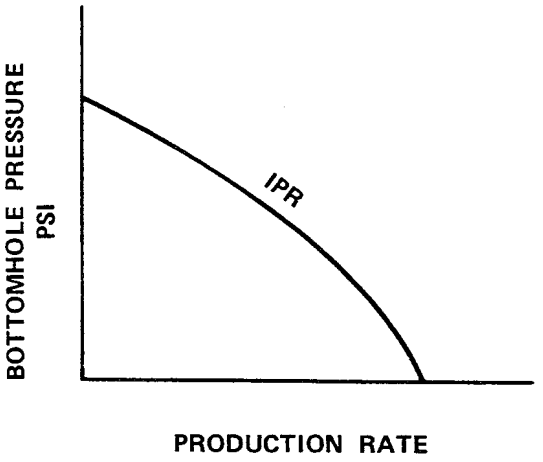
340. The well does not produce when the _____ is zero.

341. Increasing the drawdown normally increases _____ from the well.

342. The *productivity index* (PI) of a well is the ratio of the well's producing rate to the drawdown at that rate.

That is, PI = production rate/_____.

352. Here is a more typical IPR.



The IPR (is / is not) a straight line.

353. This means that the drawdown and the _____ rate are not proportional.

354. Here's why the productivity index changes.

Remember, the oil contains dissolved _____.

355. As drawdown increases, the gas comes out of solution and there is two-_____ flow.

356. The gas tends to occupy more of the volume of the rock pores.

This reduces the effective _____ of the rock to oil.

357. As drawdown increases, both fluid flow rate and friction increase.

Both gas coming out of solution and friction cause the IPR to be a _____ instead of a _____ line.

358. The general shape of the IPR is the same for most reservoirs.

So, with proper caution, one IPR can be used (with only a few reservoirs / with many reservoirs).

359. If the productivity index of a reservoir were constant, the IPR would be a straight line, but this seldom happens.

A curved IPR indicates that the PI of the reservoir does not stay _____ as drawdown increases.

360. As the drawdown increases, there is less and less production increase for a given change in the drawdown.

That is, as the drawdown increases, the PI (increases / decreases).

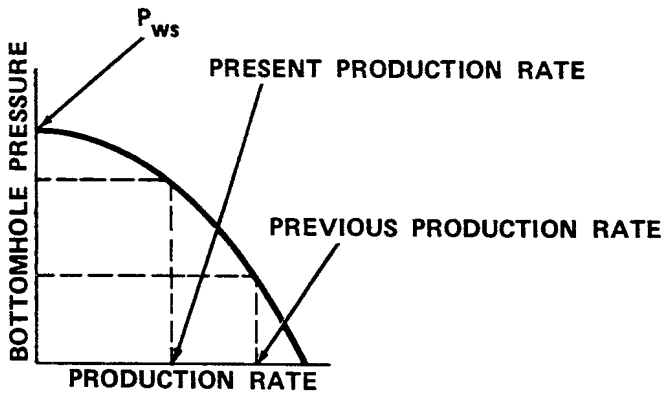
361. Suppose a well has been producing at a certain rate, but production has recently fallen off.

The problem could be in the _____ _____ system.

362. Or, the problem could be in the _____ itself.

363. What is done to restore production often depends upon the (IPR / PI) of the well.

364. This situation usually indicates a problem with the artificial lift system.



The producing bottomhole pressure is (higher / lower) than before.

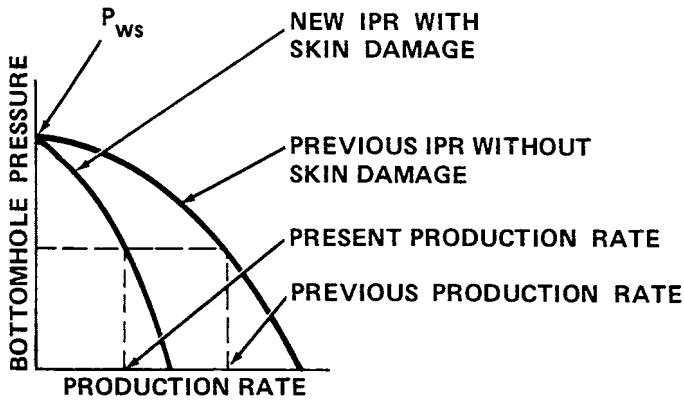
365. The production rate is (higher / lower) than before.

366. The IPR (has / has not) changed.

367. To restore production to its previous rate, the (artificial lift system / reservoir) should be worked over.

368. The reservoir (is / is not) able to produce at the former rate.

369. A curve like the one shown below may indicate that a skin has formed around the wellbore.

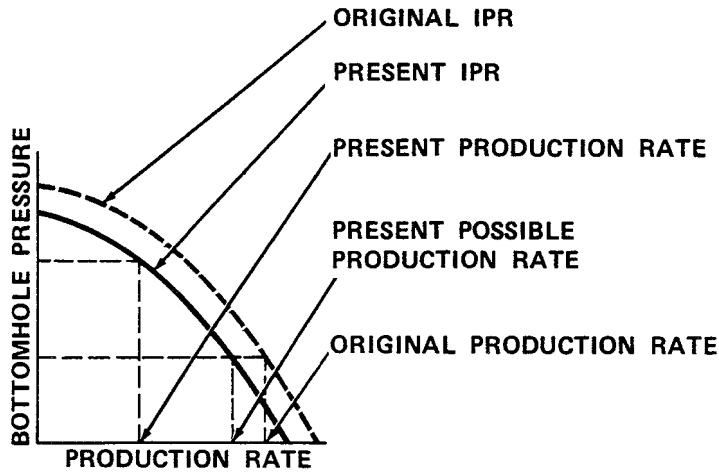


P_{ws} is (the same / different) as before.

370. But, at any P_{wf}, the production rate is (higher / lower).

371. If production is to be increased, steps must be taken to eliminate the _____.

372. A curve like the one shown here may indicate the need for a mechanical workover of the artificial lift system.



The later IPR has changed a little, but production has _____ a lot.

373. A slight change in the IPR is normal in most cases.

In a case like this, production (should / should not) fall off sharply.