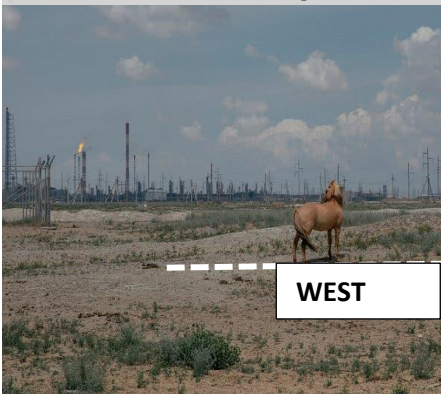


RESULTANT VECTORS

Unit 3 , Dr. John P. Cise, Professor of Physics, Austin Com. College, Austin,

Texas, USA. ipcise@austincc.edu & New York Times, August 30, 2019 by Stanley Reed, Dedicated to Bill Nye, The Science Guy

A Windswept Plain, a Sea of Oil and a Mountain of Money



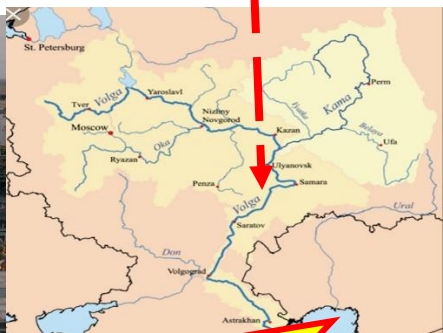
QUESTIONS: Find resultant displacement (magnitude & direction) from Tengiz oil field to Astana if : Tengiz to Almaty is 1700 miles @ 10° S of East and Almaty to Astana is 600 miles 20° West of N.

ANSWER: R = ~ 1493.8 miles @ ~ 10.4° N of East

NOTE: Thanks to Chevron for it's support of Higher Education College Engineering Academies as at ACC.

Horses roam the vast oil field in Tengiz, Kazakhstan. ENGIZ OIL FIELD, Kazakhstan — In a windswept land of salt flats and wild horses, investors are pouring money into one of the largest and most lucrative oil fields outside the Middle East. Oil has been pumped from this remote plain since the early 1990s at a pace that would have depleted fields by now. It is still gushing, and there is much more to come. The field's operators, led by the American giant Chevron, are defying conventional industry wisdom with an enormous expansion that they hope will increase production nearly 50 percent, to the rarefied mark of a million barrels a day. **They expect the oil field to be vibrant for decades.** But the project is complex, and the world's demand for oil is flattening. A question hangs over the expanse of workers and heavy machinery: Is this a smart way to spend \$37 billion?

About **48,000 people, most of them Kazakhs, are working on the expansion, many living in dormitory-like buildings.** Pieces of equipment weighing hundreds of tons — hulking sections of electric power stations and oil-processing units — arrive daily from factories in Italy, South Korea and Turkey. **After a voyage through Russia's inland waterways to a newly built port on the Caspian Sea,** the segments are hauled about 40 miles to the oil field, where a 3,200-ton crane hoists them up and eases them into place. Wood Mackenzie, a market research firm, describes the effort as the industry's largest undertaking in a decade. **The expansion is about three years from completion, but the Tengiz oil field already provides nearly a quarter of Kazakhstan's national revenue, and (about a quarter of Chevron's profits.)** Chevron approved the project in 2016 at what may have seemed like an inopportune time: The world was awash in oil, and the industry was still reeling from a price collapse that had begun in 2014. Expanding the Tengiz operation appeared to be a good bet because the field had performed so well in the past and because **Chevron places a high value on its relationship with Kazakhstan.**



Equipment from South Korea, Italy and Turkey arrives at this port on the Caspian Sea built for the expansion. A vast plant that separates crude oil from the toxic hydrogen sulfide and natural gas, so that it can be exported.

Tengiz Chevron's Northern Caspian Sea adjacent Oil field.

¼ of CHEVRON'S PROFITS FROM THIS KAZAKHSTAN oil field.