

1. Determine the grade between the points on the highway profile in percent to three decimal places:

a.	PI	= 20+70	
	EL	= 504.00	
			<b><u>- 2.143%</u></b>
	PI	= 23+50	
	EL	= 498.00	
			<b><u>+1.613%</u></b>
	PI	= 26+60	
	EL	= 503.00	
b.	PI	= 40+00	
	EL	= 461.00	
			<b><u>- 0.333%</u></b>
	PI	= 46+00	
	EL	= 459.00	
			<b><u>+1.000%</u></b>
	PI	= 52+00	
	EL	= 465.00	
c.	PI	= 55+00	
	EL	= 474.00	
			<b><u>- 1.250%</u></b>
	PI	= 59+00	
	EL	= 469.00	
			<b><u>+1.700%</u></b>
	PI	= 64+00	
	EL	= 477.50	
			<b><u>0.000%</u></b>
	PI	= 67+00	
	EL	= 477.50	

**Key**

d.	PI	= 67+00	
	EL	= 453.00	
			<b><u>+2.857%</u></b>
	PI	= 70+50	
	EL	= 463.00	
			<b><u>- 1.875%</u></b>
	PI	= 74+50	
	EL	= 455.50	
			<b><u>+1.378%</u></b>
	PI	= 79+00	
	EL	= 461.70	
e.	PI	= 29+25	
	EL	= 445.00	
			<b><u>- 4.000%</u></b>
	PI	= 32+50	
	EL	= 432.00	
			<b><u>0.000%</u></b>
	PI	= 37+75	
	EL	= 432.00	
			<b><u>+1.754%</u></b>
	PI	= 41+00	
	EL	= 437.70	

2. Compute the grade for each tangent of the highway profile and elevation for each full station on the tangents:

<u>Point</u>	<u>Station</u>	<u>Elevation</u>		<u>Point</u>	<u>Station</u>	<u>Elevation</u>
PI	25+00	466.00		PI	35+50	472.00
	<b><u>26+00</u></b>	<b><u>464.67</u></b>			<b><u>36+00</u></b>	<b><u>471.00</u></b>
	<b><u>27+00</u></b>	<b><u>463.33</u></b>		<b><u>- 2.000%</u></b>	<b><u>37+00</u></b>	<b><u>469.00</u></b>
<b><u>- 1.333%</u></b>	<b><u>28+00</u></b>	<b><u>462.00</u></b>			<b><u>38+00</u></b>	<b><u>467.00</u></b>
	<b><u>29+00</u></b>	<b><u>460.67</u></b>		PI	39+00	465.00
	<b><u>30+00</u></b>	<b><u>459.33</u></b>			<b><u>40+00</u></b>	<b><u>466.75</u></b>
PI	31+00	458.00		<b><u>+1.750%</u></b>	<b><u>41+00</u></b>	<b><u>468.50</u></b>
	<b><u>32+00</u></b>	<b><u>461.11</u></b>			<b><u>42+00</u></b>	<b><u>470.25</u></b>
	<b><u>33+00</u></b>	<b><u>464.22</u></b>		PI	43+00	472.00
<b><u>+3.111%</u></b>	<b><u>34+00</u></b>	<b><u>467.33</u></b>				
	<b><u>35+00</u></b>	<b><u>470.44</u></b>				
PI	35+50	472.00				