

Business Mathematics

Class notes

Motor-Vehicle Insurance (section 13.4)

Insurance protects a car owner against risk. There are lots of details here.

If you own a car, you will buy **insurance** to protect yourself against being held personally responsible for injuring someone else or damaging their car or property. And, of course, you do not want to pay out-of-pocket for your own car's damage. The **premium**, or cost of the insurance policy, is based on the location of the vehicle, the age and sex of the driver, miles driven, the driving history of the driver, and how much insurance you want.

There are different types of insurance you will buy. They are listed and explained below.

Type of Insurance	What it covers
Liability or Bodily Injury	Pays medical bills for people you injure
Property Damage	Pays to repair or replace someone else's property
Comprehensive	Pays when your car is damaged by fire, theft, vandalism, a tree falling, or other similar events
Collision	Pays when your car is damaged when it is being driven and collides with an object
Uninsured and Underinsured Motorist	Pays when you are hit by an uninsured or underinsured (too little insurance to cover the cost) motorist

We will see tables giving us annual premium rates for these types of insurance.

We will find **annual premiums** for various situations based on several tables. If the driver is below 25, we multiply this premium by a **Youthful-Operator Factor**. This is due to the fact that some young drivers are involved in more accidents than more experienced drivers; we have a table for this. To reduce the cost of a premium, you may have a **deductible** on your policy. This means you will pay some amount (usually between \$200 and \$2,000) before the insurance company pays out.

Here are the tables we will use. **Actuaries** at insurance companies have much more extensive tables to calculate your premium.

Property Damage Insurance Premium (per year)				
Property Damage Limits				
Territory	\$10,000	\$25,000	\$50,000	\$100,000
1	\$88	\$93	\$97	\$103
2	168	192	223	251
3	129	134	145	158
4	185	203	236	262

If you live in Territory 4, the insurance company will pay up to a \$10,000 payout for an annual premium of \$185.

Liability (Bodily Injury) and Medical Insurance Premium (per year)

Liability and Medical Expenses Limits					
Territory	15/30 \$1,000	25/50 \$2,000	50/100 \$3,000	100/300 \$5,000	250/500 \$10,000
1	\$207	\$222	\$253	\$282	\$308
2	269	302	341 #1a	378	392
3	310	314	375	398	459
4	340	362	375	398	445

The meaning of "15/30 \$1,000" is that the insurance company will pay up to \$15,000 to any one person injured, but the maximum payout for two or more people is \$30,000. They will pay \$1,000 for medical expenses for a passenger in the insured vehicle, no matter who is at fault.

Comprehensive and Collision Insurance Premium (per year)

		Comprehensive (\$2,000 Deductible) #1a			Collision (\$2,000 Deductible)		
		Symbol			Symbol		
Territory	Age Group	6	7	8	6	7	8
1	1	\$58	\$64	\$90	\$153	\$165	\$184
	2,3	50	56	82	135	147	171
	4,5	44	52	76	116	128	147
	6	34	44	64	92	110	128
2	1	\$26	\$28	\$40	\$89	\$95	\$104
	2,3	40	52	68	80	86	98
	4,5	20	24	34	71	77	86
	6	30	36	45	95	103	115
3	1	\$70	\$78	\$108	\$145	\$157	\$174
	2,3	60	66	90	128	139	162
	4,5	52	64	92	111	122	139
	6	48	59	63	110	132	157
4	1	\$42	\$46	\$66	\$97	\$104	\$124
	2,3	36	40	58	87	94	107
	4,5	32	38	54	77	84	94
	6	60	68	84	140	158	166

The Symbol is based on the cost to repair your specific vehicle.

The Age Group is interpreted as 1: the insured car is less than 2 years old,

2,3: the insured car is at least 2 years old but less than 4,

4,5: the insured car is at least 4 years old but less than 6,

6: the insured car is at least 6 years old.

**Uninsured Motorist
Premium (per year)**

Territory	Basic Limit
1	\$242
2	219
3	317 #1a
4	285

Some states have **no-fault laws**. All medical expenses and costs are paid by your own insurance company, no matter who is at fault. Most states (including Illinois and Missouri) do *not* do this. The insurance company of the person at fault must pay damages. But what if that driver does *not* have insurance?

Youthful-Operator Factor

Age	With Driver's Training	Without Driver's Training
20 or less	2.35	2.95
21 - 25	2.10	2.40 #1b

This is multiplied by the total premium if the insured driver is 25 or less years old.

Wow! Let's do this thing.

expl 1a: Find the annual premium this driver will pay.

Name: Mr. Pseudo Nymm

Territory: 2

Age: 67

Driver Training?: No

Liability: 50/100

Property Damage: \$100,000

Comprehensive/Collision Age Group: 1

Symbol: 6

Uninsured Motorist?: Yes

Go through the tables one by one. If they apply, find the appropriate premiums and add them up.

annual premium

$$= 251 + 341$$

$$+ 26 + 89 + 219 =$$

$$= \$926 / \text{year}$$

expl 1b: What would his premium be if Mr. Pseudo Nymm was 21 years old, keeping everything else the same?

$$\text{Ann. prem} = 926 * 2.40$$

$$= \$2222.40$$

Find the Youthful-Operator Factor and multiply.

Insurance Payouts:

So, how much will the insurance company pay if you are in an accident? How much will you be on the hook for?

expl 2: One dark and stormy night, Bob Armstrong lost control of his car and crashed into another car. He had 15/30 liability limits, \$10,000 property damage limits, and collision coverage with a \$100 deductible. Damage to Bob's car was \$2,980 but the other car, with a value of \$22,800, was totaled. The results of a lawsuit awarded \$75,000 and \$45,000, respectively, in damages for personal injury for the two people in the other car. Find the amount that the insurance company will pay for

- a.) repairing Bob's car,
- b.) repairing the other car, and
- c.) personal injury damages.
- d.) Also, find the amount that Bob must pay beyond his insurance coverage.

total
\$120,000

- a.) Take the deductible off the repair cost of Bob's car.
- b.) Property damage limits apply to the other car's damage.
- c.) The 15/30 liability limits apply for personal injury to other people.

d.) We add up the costs that the insurance company does *not* pay for.

Insurance pays:

- a) Bob's car \$2,880
- b) other car \$10,000
- c) injuries \$30,000

Bob pays

- \$100 (deduct)
- \$12,800 (balance)
- \$90,000 (balance)

↓ add

- d) Bob owes
\$102,900