An Updated Survey of Security Software for Windows Computers

Gathered from Published Reviews and Test Reports

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(slides amended 12/04/2018)

(for Apple and Android users, test results charts are included, without interpretation, for readers to make their own study)

Agenda for the Presentation

- Microsoft Windows Defender Anti-Malware -
   is it competent enough?   In Windows 10, Yes.
- Current Opinion & Test Results on MalwareBytes.
- Survey of Anti-ransomware software.
- Test Results of 3rd party AV & Internet Security software.

Subject Table to the Slides

note: slide number appears lower right

Microsoft Windows Defender (in Windows 10) - now worthy of respect.

Protection has improved just in the last six months;

- Evidence by both SELabs and AV-comparatives Tests.
    Simon Edwards Lab Reports are downloadable
    pdf documents, well written with complete explanations.
    https://selabs.uk/en/reports/consumers
    AV-Comparatives tests many aspects of Anti-virus
    programs' behavior besides anti-malware protection.
    www.av-comparatives.org

- Informative Test Results from www.av-test.org/en/home
    and Consumer Reports Online[14] (CR's test dates were
    June-July 2018, so Defender doesn't rate as highly then)

Evidence of Windows Defender's Improved Performance

- Sequence of Test Results in 2018 by Simon Edwards Labs on Windows Defender:

Test dates:	Protection	Legitimate Accuracy	Total Accuracy	Award
Jul-Sep 2018	98%	100%	99%	AAA
Apr-Jun 2018	89%	100%	96%	AAA
Jan-Mar 2018	48%	100%	81%	B

- The next slide is the Jul-Sep 2018 Test Summary by SE Labs on the competing Anti-virus products.

- Slide #7 is a chart of the Protection Result Details on the competing Anti-virus products in the Jul-Sep 2018 tests.

Simon Edwards Labs' Tested Protection Scores July-September 2018 Test Series

Legitimate Accuracy = how accurately the product classifies legitimate applications & URLs

EXECUTIVE SUMMARY			
Products Tested	Protection Accuracy Rating (%)	Legitimate Accuracy Rating (%)	Total Accuracy Rating (%)
Kaspersky Internet Security	100%	100%	100%
Norton Security	98%	100%	99%
Windows Defender	98%	100%	99%
ESET Smart Security	98%	100%	99%
Avira Free Security Suite	90%	100%	97%
Trend Micro Internet Security	90%	99%	96%
AVG Antivirus Free Edition	81%	100%	94%
F-Secure Safe	94%	92%	93%
G-Data Internet Security	76%	100%	92%
Avast Free Antivirus	71%	100%	91%
McAfee Internet Security	71%	100%	91%
Quick Heal Internet Security	63%	100%	88%
Webroot Antivirus	54%	95%	82%

Win Defender rated 98% because it failed to remediate ten threats completely.

# This slide shows the Degree of Protection Success, from SE Labs

Anti-virus Product Test Results in Windows 10, performed by Simon Edwards Labs

PROTECTION DETAILS					
Product	Detected	Blocked	Neutralised	Compromised	Protected
Kaspersky Internet Security	100	99	1	0	100
Norton Security	100	98	2	0	100
ESET Smart Security	99	99	0	1	99
Windows Defender	100	100	0	0	100
F-Secure Safe	99	97	2	1	99
Trend Micro Internet Security	100	98	0	2	98
Avira Free Security Suite	99	93	4	3	97
AVG Antivirus Free Edition	98	82	11	7	93
Avast Free Antivirus	99	73	18	9	91
G-Data Internet Security	94	88	1	11	89
Webroot Antivirus	93	72	16	12	88
McAfee Internet Security	96	86	0	14	86
Quick Heal Internet Security	96	81	2	17	83

Test dates - July through September, 2018

AV-Comparatives Real World Protection Test - Degree of Threat Blocking Measured, in Windows 10 Pro

| Consumer ▼ | Real-World Protection Test ▼ | 2018 ▼ | Oct ▼ | by value ▼ | 80 - 100% ▼ |

Legend: Blocked ■ User dependent ■ Compromised ■ False Positives ─●─
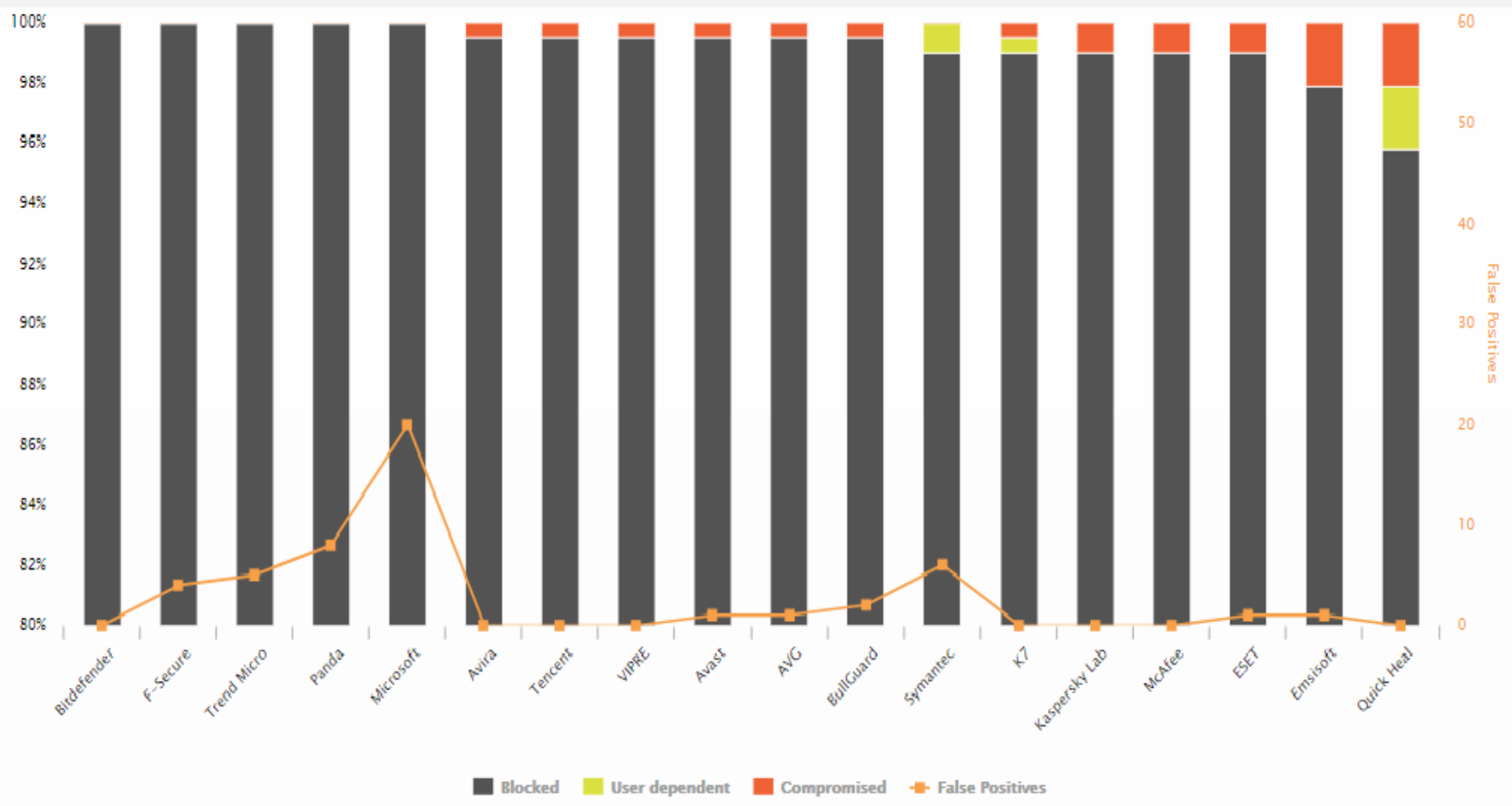
Windows 10: August 2018
Anti-malware Tests Performed by AV-Test.org

Producer	Certified	Protection	Performance	Usability
VIPRE — VIPRE AdvancedSecurity 10.3	TOP PRODUCT	6	6	6
Norton — Norton Security 22.14	TOP PRODUCT	6	6	5.5
Microsoft — Windows Defender 4.12 &4.18	TOP PRODUCT	6	5.5	6
McAfee — Internet Security 21.2	TOP PRODUCT	6	6	6
KASPERSKY — Internet Security 19	TOP PRODUCT	6	6	6
BullGuard — Internet Security 18.1	TOP PRODUCT	6	6	5.5
Bitdefender — Internet Security 22.0	TOP PRODUCT	6	6	6
Avira — Antivirus Pro 15.0	TOP PRODUCT	6	6	6
AVG — Internet Security 18.5	TOP PRODUCT	6	5.5	6
avast — Free AntiVirus 18.5	TOP PRODUCT	6	5.5	6
AhnLab — V3 Internet Security 9.0	TOP PRODUCT	6	6	5.5
TREND MICRO — Internet Security 12.0	AV TEST	6	5.5	5.5
PC Pitstop — PC Matic 3.0	AV TEST	5.5	4.5	2.5
eScan — eScan Internet Security Suite 14.0	AV TEST	5	6	6

Advantages & Disadvantages of Windows 10 Defender:

<u>Pro</u>, compared to 3rd-party Anti-malware products:

- Doesn't pop-up ads urging you to buy an upgraded version.
- Microsoft has the opportunity to take advantage of special hardware features for security because Defender is built into the Windows 10 operating system – close coupling to the CPU – examples next slide.
- Includes Windows Defender Offline (for you to select manually); runs before Windows boots up fully, better able to catch malware.
- Includes simple ransomware protection;
  (but note it's turned off by default!)
  This ransomware protection is more capable in Windows Pro than the Home version, by availability of Group Policy Settings in Pro.

Special hardware accommodations in CPU chips

- Core Isolation
- Secure Boot – prevents rootkits from loading
- TPM 2.0 (also referred to as your security processor) - (Trusted Platform Module), provides encryption
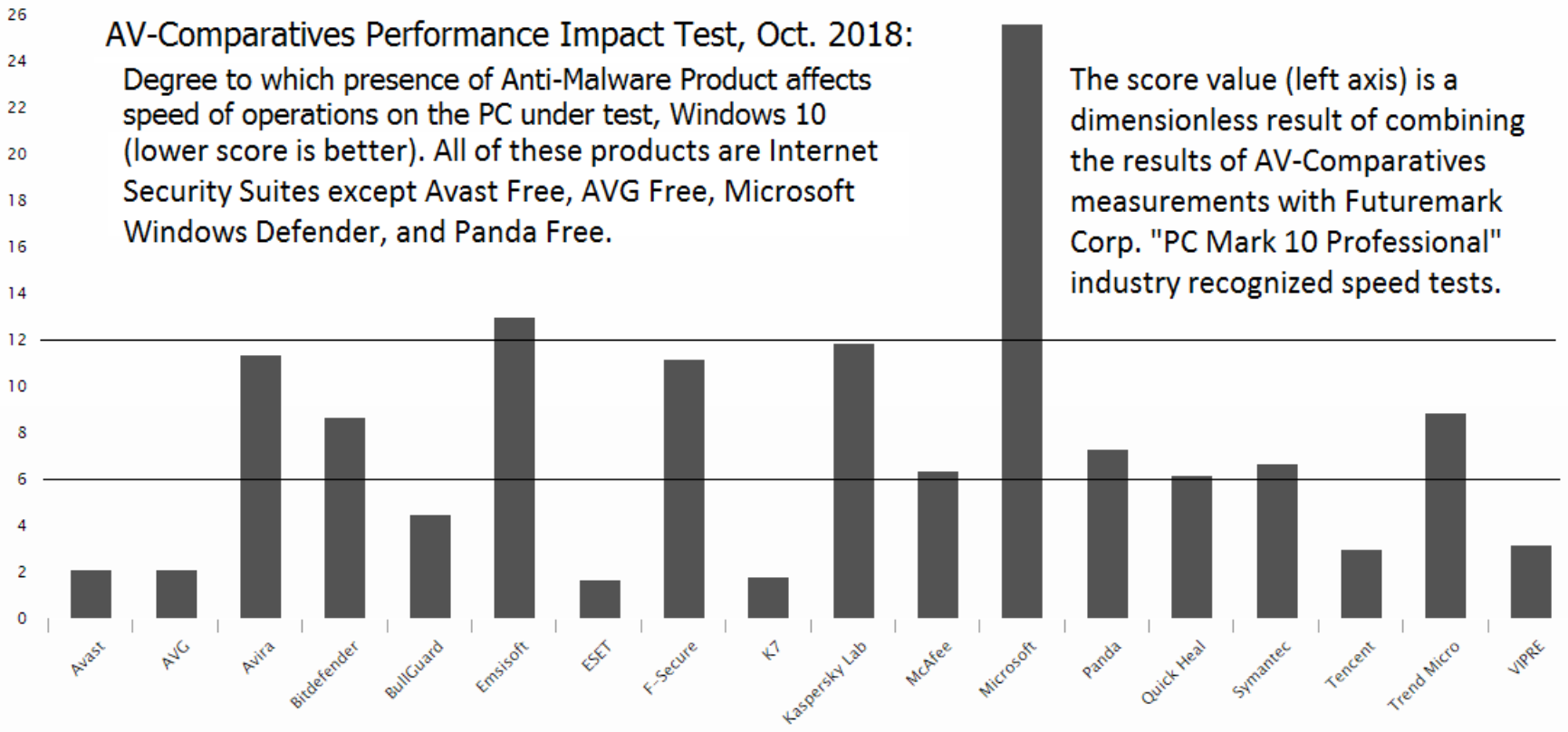- DEP (Data Execution Prevention)
- UEFI MAT
- BIOS settings

(Glossary in slides xxx and yyy provides more explanation)

<u>Pro</u>, continued:

- Defender has extras that most free AV software doesn't.
  It's part-way to an Internet Security Suite, e.g.
  Has parental filtering, backup management, and a PC tune-up function.

<u>Con</u>:

- Full scans are slow; 1.5 hours vs. typically 0.5 hour for other products.[6] Windows Defender Offline similarly takes a while.
- AV-comparatives tests (next slide) indicate Defender's presence weighs on PC resources more than most 3rd-party competitors.
- Defender seems to generate more false alarms than the competitors – go back to slide # 8 (AV-Comparatives)
- Consumer Reports rates User Help as only fair.

AV-Comparatives Performance Impact Test, Oct. 2018:

Degree to which presence of Anti-Malware Product affects speed of operations on the PC under test, Windows 10 (lower score is better). All of these products are Internet Security Suites except Avast Free, AVG Free, Microsoft Windows Defender, and Panda Free.

The score value (left axis) is a dimensionless result of combining the results of AV-Comparatives measurements with Futuremark Corp. "PC Mark 10 Professional" industry recognized speed tests.

Some further insight into the significance of these relative performance scores is given in the next chart, where AV-Comparatives shows the performance change for particular user tasks commonly done on a PC, due to the presence of the anti-virus software.

Performance Impact Tests on Anti-virus Software Products, by AV-Comparatives, Oct. 2018;

(running Windows 10 64-bit, on Lenovo E560 Laptop PCs, Core i5-6200U CPU, 8 GB RAM, SSD hard disks)

Three green bars represents the least slowing effect.

Vendor	File copying		Archiving / Unarchiving	Installing / Uninstalling Applications	Launching Applications		Downloading Files	Browsing Webites
	First Run	Subsequent Run			First Run	Subsequent Run		
Avast	▪▪▪	▪▪▪	▪▪▪	▪▪▪	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪
AVG	▪▪▪	▪▪▪	▪▪▪	▪▪▪	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪
Avira	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	(▪▪▪)	▪▪▪
Bitdefender	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	(▪▪▪)	▪▪▪
BullGuard	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪
Emsisoft	▪▪▪	▪▪▪	▪▪▪	(▪▪▪)	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪
ESET	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪
F-Secure	(▪▪▪)	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪	▪▪▪	(▪▪▪)	▪▪▪
K7	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪
Kaspersky Lab	(▪▪▪)	▪▪▪	(▪▪▪)	▪▪▪	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪
McAfee	▪▪▪	▪▪▪	▪▪▪	(▪▪▪)	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪
Microsoft	(▪▪▪)	(▪▪▪)	(▪▪▪)	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪	▪▪▪
Panda	▪▪▪	▪▪▪	(▪▪▪)	▪▪▪	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪
Quick Heal	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	(▪▪▪)
Symantec	▪▪▪	▪▪▪	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪
Tencent	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪
Trend Micro	▪▪▪	▪▪▪	▪▪▪	▪▪▪	(▪▪▪)	(▪▪▪)	▪▪▪	▪▪▪
VIPRE	(▪▪▪)	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪

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Comments on Performance Tests:

- One can see from the previous slide that different AV programs have different effects on actual operation of the PC.

- For example, although Windows Defender slows file copying, archiving, or installing or uninstalling applications, if you rarely do these operations, then this disadvantage shouldn't matter much.

- The AV-C performance tests were done on Lenovo E560 laptops with Intel Core i5 6200U CPU, 8GB RAM, and SSD hard disks, a fast business-class PC, circa 2016. If your PC is older/slower, you may see more impact than indicated.

- Different test organizations take different measures of PC operation as their Performance Tests. In contrast to AV-C, Consumer Reports measures the anti-virus software's use of memory, impact on boot-up time, and tendency to slow computer operation during a scan.

Microsoft Knows What's Best for you:

"Windows Defender will soon be adding protection from PC cleaning or optimization utilities that try to nag and generally coerce the user into an upgrade. Defender will employ certain 'evaluation criteria' to pick out apps which are identified as either unwanted software or straight-out malware, . . and removed" (automatically) – coming in March 2018.

Microsoft explains in a blog post: "To help protect customers from receiving such coercive messaging, we are updating our evaluation criteria to specify that programs must not use alarming or coercive messaging that can put pressure on customers into making a purchase or performing other actions."

An Update on MalwareBytes:

MalwareBytes Free and Premium ($40 per year) are both
no longer recommended (although no harm in using either one);

- Its malware detection test scores are lower than the best regular anti-Virus products for detection of malware – refer to
    - Specific Malware Detection Tests by Neil Rubenking, PCMag.com[7]
    - Inferior malware detection in on-demand scanning, by Consumer Reports, July 30, 2018; see slide #20
- Consumer Reports observed that MalwareBytes Premium stopped using its own anti-virus engine after a week and reverted to Windows Defender, with no notification to the user.

Conclusion: It's not worth paying for MalwareBytes Premium.

Give Malwarebytes Free Version a Second Chance?

There are devotees who insist Malwarebytes will detect malware other programs miss and is more capable of removing it completely.

You can acquire and keep MalwareBytes Free (if you don't already have it) by taking a two-week trial of MalwareBytes Premium, and it will scale back to the Free version when you elect not to pay.
www.malwarebytes.org

The Free version does not run except when you start it manually, and you need to update the signatures manually before beginning a scan. (see Malwarebytes Free "dashboard" display in next slide, alerting "Your databases are out of date," with the "Fix Now" button).

Run a scan every couple of months, or when you sense something may be wrong in the operation of your PC.

Malwarebytes Anti-Malware Home (Free) 2.2.0.1024

DASHBOARD   SCAN   SETTINGS   HISTORY   ACTIVATE   **UPGRADE NOW**

Your databases are out of date   **Fix Now**

License	● Malwarebytes Anti-Malware (Free)	Buy Premium »
Database Version	● v2018.05.12.03	Update »
Scan Progress	● Not Running	
Real-Time Protection	● Available with Malwarebytes Anti-Malware Premium	Start Free Trial »

Scan Now

Need Help?

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Consumer Reports mid-2018 Test Results on Free Anti-virus Software
(date of test report - July 30, 2018)

Overall Score	Brand & Model / Price	Protection	On access	On demand	Ease of use	Messages/Interface	Help	Anti-malware	Use of resources
Free Anti-Malware Programs									
75 OVERALL SCORE (Add to Compare)	**Bitdefender** Free Edition — ✅ Recommended — Price: $0.00 — **Has anti-spyware** — [Bitdefender]	⏫	⏫	⏫	🟡	🔼	⏬(red)	🟡	🔼
72 OVERALL SCORE (Add to Compare)	**Avast** Free Antivirus 2018 — ✅ Recommended — Price: $0.00 — **Has anti-spyware and a password manager** — [avast]	🔼	🔼	⏫	🟡	🔼	🔽(orange)	🟡	🔼
71 OVERALL SCORE (Add to Compare)	**Avira** Free Antivirus - 2018 — ✅ Recommended — Price: $0.00 — **Has anti-spyware, and informative help** — [Avira]	🔼	🔼	⏫	🟡	🟡	🟡	🟡	⏫
69 OVERALL SCORE (Add to Compare)	**AVG** Free Antivirus — ✅ Recommended — Price: $0.00 — **Has anti-spyware, and email protection** — [AVG]	🔼	🔼	⏫	🟡	🔼	🔽(orange)	🟡	🔼
64 OVERALL SCORE (Add to Compare)	**Kaspersky** Free Antivirus — Price: $0.00 — **Has anti-spyware, and informative help** — [KASPERSKY]	🟡	🟡	⏫	🔼	🔼	🔼	🟡	🔼
61 OVERALL SCORE	**Microsoft** Windows 10 - Defender — Price: $0.00 — **Has a firewall, anti-spyware, parental filters, backup manager, and PC tune-up** — [Microsoft]	🟡	🟡	🔼	🟡	⏫	🔽(orange)	🟡	🔼

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Consumer Reports' mid-2018 Test Results on Paid-subscription Internet Security Software

Overall Score	Brand & Model / Price	Protection	On access	On demand	Ease of use	Messages/Interface	Help	Anti-malware	Use of resources
Security Suites									
80	**Bitdefender** Internet Security - 2018 — Recommended — Price: $40.00. Has a firewall, anti-ransomware, banking protection, spam filter, password mgr. & informative help. (Add to Compare)	⇧⇧ green	⇧⇧ green	⇧⇧ green	! yellow	⇧ green	! yellow	⇧ green	⇧ green
77	**Norton** Security Deluxe - 2018 — Recommended — Price: $50.00. Has a firewall, anti-spyware, anti-ransomware, spam filter, PC tune-up, & informative help. (Add to Compare)	⇧⇧ green	⇧⇧ green	⇧⇧ green	! yellow	⇧ green	⇧⇧ green	! yellow	⇧ green
76	**Trend Micro** Internet Security - 2018 — Recommended — Price: $40.00. Has anti-spyware, anti-ransomware, PC tune-up, spam filter, email protection, & parental filters. (Add to Compare)	⇧⇧ green	⇧⇧ green	⇧ green	! yellow	⇧ green	! yellow	! yellow	⇧ green
76	**Kaspersky** Internet Security - 2018 — Recommended — Price: $30.00. Has a firewall, anti-spyware, anti-ransomware, spam filter, email prot., banking prot., parental filtering, PC tune-up, & informative help. (Add to Compare)	⇧ green	⇧ green	⇧⇧ green	⇧ green	⇧ green	⇧ green	⇧ green	⇧ green
75	**BullGuard** Internet Security - 2018 — Recommended — Price: $30.00. Has a firewall, anti-spyware, PC tune-up, spam filter, email prot., parental filtering, back-up mgr. (Add to Compare)	⇧⇧ green	⇧⇧ green	⇧⇧ green	! yellow	⇧ green	⇩ orange	! yellow	⇧ green
73	**Avast** Internet Security - 2018 — Recommended — Price: $80.00. Has a firewall, anti-spyware, anti-ransomware, spam filter, email protection, banking prot. & passwd mgr. (Add to Compare)	⇧ green	⇧ green	⇧⇧ green	! yellow	⇧ green	! yellow	! yellow	⇧ green
72	**Eset** Internet Security - 2018 — Recommended — Price: $70.00. Has a firewall, anti-spyware, anti-ransomware, banking protection, parental filtering, informative help (Add to Compare)	⇧ green	⇧ green	⇧⇧ green	⇧ green	⇧ green	⇧ green	⇧ green	⇧ green
72	**F-Secure** SAFE - 2018 — Recommended — Price: $70.00. Has anti-spyware, anti-ransomware, banking protection, parental filtering, & password manager. (Add to Compare)	⇧ green	⇧ green	⇧⇧ green	! yellow	⇧ green	! yellow	! yellow	⇧ green
71	**AVG** Internet Security - 2018 — Recommended — Price: $55.00. Has a firewall, anti-spyware, anti-ransomware, spam filter, & email protection. (Add to Compare)	⇧ green	⇧ green	⇧⇧ green	! yellow	⇧ green	⇩ orange	! yellow	⇧ green
58	**G Data** Internet Security - 2018 — Price: $50.00. (Add to Compare)	! yellow	! yellow	⇧⇧ green	! yellow	⇧ green	⇧ green	! yellow	⇧ green
36	**Malwarebytes** Premium — Price: $60.00. Note the inferior rating in Col. 3, effectiveness of on-demand scans for malware, and the only-average rating in Col. 7, malware scanning. (Add to Compare)	⇩ orange	⇩ orange	⇩ orange	! yellow	⇧ green	⇩⇩ red	! yellow	⇧ green

Recommendations for Security Software:

For Windows 10: Microsoft Windows Defender (built-in), unless you want a more fully featured Internet Security Suite.

- add an anti-ransomware product;
- occasionally run "Windows Defender Offline" or another 3rd-party downloadable Anti-virus scanner as a backstop.

For Windows 7 or 8.1: Choose a free or paid Anti-virus, or if more features are wanted, an Internet Security Suite;

- add an anti-ransomware product (if not already included);
- occasionally run a third party downloadable Anti-virus scanner as a backstop.
- Unfortunately one can't say whether test results for Win 10 are representative for the same AV running in Win 7 or 8.1; the test houses aren't testing in Win 7 or 8.1 anymore.

Recommendations for Security Software (cont.)

From the test results screenshot slides there are clearly a number of the 3rd party programs that provide excellent protection, both free and by paid subscription.

Your choice may be influenced by secondary matters such as

- specific extra features in Internet Security Suites
  (refer to Consumer Reports Test Results charts, slides # 20-21)
- processor slowdown, dubbed "Performance."
- user opinions or annoyances – not covered here, but take a look at user reviews on amazon.com (user feedback on Consumer Reports is rather thin this year)
- if you're content with your current AV software, just keep it up-to-date.

Anti-ransomware products come in three flavors, Blocking, Removal & Recovery, or all three combined.

Ransomware blocking SW:

- CyberSight RansomStopper (free), PCMag Editors' Choice [9] note: requires rebooting your PC to complete the installation. (The only test report found at this time is by Neil Rubenking at PCMag, but RansomStopper performed flawlessly).

- Bitdefender Anti-Ransomware (free) runs alongside your primary anti-virus. Protects from known threats.
- Bitdefender Antivirus Plus ($26 per year); PCMag Editors' Choice [9]
  - uses a behavior monitoring engine, as part of full anti-malware protection;
  - Safe Files feature you set up blocks unauthorized programs from changing files in Protected Folders.
  - can sometimes cause issues with legitimate programs which need to write to protected folders [10]

Ransomware blocking SW, continued

Panda Internet Security (costs $64.95 per year) includes Data Shield;

- lets only trusted applications access or change specific file types;
- can cause conflicts with legitimate applications which need to access protected files. [10](TechRadar article)

Anti-ransomware, continued:

Recovery type products:[(10a)]

- Avast Free Ransomware Decryption Tools:
  - tackles 21 different strains of file-locking ransomware.
  - send Avast one encrypted file and the corresponding normal file; they'll recover the password to recover all the files.

- Trend Micro Ransomware File Decryptor (free) single download that
  - can defeat 27 breeds of ransomware.
  - receives regular updates of ransomware definition files.

- Trend Micro Ransomware Screen Unlocker Tools (free):
  - releases a locked PC, even if you can't access Safe Mode;
  - receives regular updates of ransomware definition files.

Anti-ransomware, continued:

Both Blocking and Recovery:[10]

- AppCheck Pro (costs $11 for year one) runs alongside your antivirus, watching all running processes for ransomware-like behavior. AppCheck's sophisticated engine keeps an eye on your MBR (Master Boot Record) and GPT (GUID Partition Table) as well as your files. AppCheck performed well [10] (TechRadar test review)

- Webroot SecureAnywhere AntiVirus, (costs $19 per year)
  - designed to run alongside other security software;
  - tracks file changes made by malware.
  - usually able to undo file changes and recover original data.
  - PCMag Editors' Choice (scored 4.5 out of 5 in testing)[9]

Anti-ransomware:

Both Blocking and Recovery, continued:

Checkpoint ZoneAlarm Anti-ransomware ($20 per year).
- monitors processes to check for suspect actions, allowing it to spot even brand new, previously unknown threats.
- can recover encrypted files
- missed one simulated threat in testing by TechRadar [10]
- a PCMag Editors' Choice product (scored 4.5 out of 5)[9]

Summary Chart from PCMag on Testing of Anti-ransomware Products, July 17, 2018

Product	Bitdefender Antivirus Plus	Check Point ZoneAlarm Anti-Ransomware	Webroot SecureAnywhere AntiVirus	CyberSight RansomStopper	Acronis Ransomware Protection	Cybereason RansomFree	Malwarebytes Anti-Ransomware Beta	CryptoDrop Anti-Ransomware	Bitdefender Anti-Ransomware	Trend Micro RansomBuster
Lowest Price	$25.99 SEE IT	$19.95 SEE IT	$18.99 SEE IT	$0.00 MSRP	Free SEE IT	$0.00 MSRP	$0.00 MSRP	$29.99 MSRP	Free SEE IT	$0.00 MSRP
Editors' Rating	●●●●◐ EDITORS' CHOICE	●●●●◐ EDITORS' CHOICE	●●●●◐ EDITORS' CHOICE	●●●●◐ EDITORS' CHOICE	●●●●○	●●●●○	●●●●○	●●●○○	●●●○○	●●●○○
Protection Type	Antivirus	Ransomware Protection	Antivirus	Ransomware Protection	Ransomware Protection	Ransomware Protection	Ransomware Protection	Ransomware Protection	Ransomware Protection	Ransomware Protection
Behavior-Based Detection	✓	✓	✓	✓	✓	✓	✓	✓	—	✓
Prevent File Modification	✓	—	—	—	—	—	—	—	—	✓
Prevent All File Access	—	—	—	—	—	—	—	—	—	—
Recover Files	✓	✓	✓	—	✓	—	—	✓	—	✓
Vaccination	—	—	—	—	—	—	—	—	✓	—

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Recommendations for Anti-ransomware:

1) CyberSight RansomStopper (free) (in addition to your regular Security Software)
   It's a new product, but an Editor's Choice in PCMag – try it?

2) Webroot Secure Anywhere Anti-virus (in addition to your regular Security Software).
   - very good test scores from PCMag; 4.5* Editor's Choice.
   - didn't score well at S.E. Labs, but it's not your primary AV.

3) BitDefender Anti-virus Plus or Internet Security (as your primary Security SW)
   - good test scores from PCMag; 4.5* Editor's Choice.
   - BitDefender I.S. is top rated by Consumer Reports AV-Test.org, and AV-Comparatives.org

4) Refer to the PCMag Summary Chart slide for other choices
   Full reviews on each product in the PCMag article[9]

Key to Column Headings in Consumer Reports' Test Result Charts:

- Consumer Reports Overall Score: performance detecting and blocking online and offline threats, ease of use, and effective response to newly-discovered malware.
- Protection: How well the product protected against live exploits from websites.
- On access: How well the product protected automatically against live exploits from websites and local drives, as you use the PC.
- On demand: Measures effectiveness (in user-initiated) scanning for malware, both online and offline.

Key to Column Headings, Consumer Reports (continued):

- Ease of use score: covers installation, changing settings, and interacting with the software.
- Messages/Interface score: Expects easy-to-access, clear, and concise messages.
- Help score: Expects clear, useful instructions on a particular setting or activity in the software.
- Anti-malware score: rates the effectiveness for scanning the p.c. on demand for malware, both online and offline.
- Use of Resources: measures the software's use of memory, impact on boot-up time, and tendency to slow computer operation during a scan.

Anti-virus Products for Apple Mac PCs, Tested by Consumer Reports, 2018

Overall Score	Brand & Model / Price	Protection	On access	On demand	Ease of use	Messages/Interface	He a	Anti-malware	Use of resources
Free Anti-Malware Programs									
66	**Avira** Free Antivirus for Mac — Recommended — Price: $0.00 — Shop — Add to Compare	●	●	●	●	●	●	●	●
59	**Avast** Free Mac Security for Mac — Price: $0.00 — Shop — Add to Compare	●	●	●	●	●	●	●	●
56	**AVG** Free Antivirus for Mac — Price: $0.00 — Shop — Add to Compare	●	●	●	●	●	●	●	●
Security Suites									
79	**Norton** Security Deluxe for Mac — Recommended — Price: $50.00 — Shop — Add to Compare	●	●	●	●	●	●	●	●
76	**G Data** Antivirus for Mac — Recommended — Price: $40.00 — Shop — Add to Compare	●	●	●	●	●	●	●	●
72	**Kaspersky** Internet Security for Mac — Recommended — Price: $30.00 — Shop — Add to Compare	●	●	●	●	●	●	●	●
70	**Bitdefender** Antivirus for Mac — Price: $48.00 — Shop	●	●	●	●	●	●	●	●

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macOS High Sierra: June 2018
Anti-malware for Apple Mac PC's, Tests performed by AV-Test.org

Producer		Certified	Protection	Performance	Usability
TREND MICRO	Antivirus 8.0	AV-TEST	6	6	6
Norton by Symantec	Norton Security 7.6	AV-TEST	6	6	6
KASPERSKY	Internet Security 18.0	AV-TEST	6	5.5	6
Intego	VirusBarrier 10.9	AV-TEST	6	6	6
Bitdefender	Antivirus for Mac 6.1	AV-TEST	6	6	6
avast	Security 13.5	AV-TEST	6	4	6
Avira	Antivirus Pro 3.9	AV-TEST	5.5	5	6
F-Secure	Safe 17.2	AV-TEST	4.5	5	6

Android: September 2018 Anti-virus Product Tests by AV-Test.org

In the report online click on each product line for more explanation; smartphone model tested is not given however.

Producer	Certified	Protection	Usability
TREND MICRO — Mobile Security 9.5	✓	6	6
腾讯手机管家 WeSecure 1.4	✓	6	6
SOPHOS — Mobile Security 8.5	✓	6	6
Norton by Symantec — Norton Mobile Security 4.3	✓	6	6
McAfee — Mobile Security 5.0	✓	6	6
KASPERSKY — Internet Security 11.17	✓	6	6
G DATA — Internet Security 26.4	✓	6	6
F-Secure — Safe 17.4	✓	6	5.5
cheetah mobile — Security Master 4.7	✓	6	3
Bitdefender — Mobile Security 3.3	✓	6	6
AVG — AntiVirus Free 6.10	✓	6	6
avast — Mobile Security 6.11	✓	6	6
ANTIY — AVL 2.7	✓	6	3
阿里安全 ALIBABA SECURITY — Mobile Security 5.8	✓	6	5.5
IKARUS security software — mobile.security 1.7	✓	5.5	4.5
Avira — Antivirus Security 5.3	✓	5.5	6

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Smart Watches & Fitness-Tracker Security Tests
Conducted by AV-Test.org, 2018

	Producer	Certified	Tested	Date of expiry
	Apple Watch Series 3	SECURITY STATUS iot-tests.org ★★★	May 2018	November 2018 ›
	Fitbit Charge 2	SECURITY STATUS iot-tests.org ★★★	May 2018	November 2018 ›
	Garmin vívofit 3	SECURITY STATUS iot-tests.org ★★★	May 2018	November 2018 ›
	Huawei Band 2 Pro	SECURITY STATUS iot-tests.org ★★★	May 2018	November 2018 ›
	Jawbone UP3	SECURITY STATUS iot-tests.org ★★★	May 2018	November 2018 ›
	Nokia Steel HR	SECURITY STATUS iot-tests.org ★★★	May 2018	November 2018 ›
	Pingonaut Pingonaut Kidswatch	SECURITY STATUS IP CAMERAS ★★★	November 2017	May 2018 ›
	Samsung Fit 2 Pro	SECURITY STATUS iot-tests.org ★★★	May 2018	November 2018 ›
	TomTom Spark 3	SECURITY STATUS iot-tests.org ★★★	May 2018	November 2018 ›

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Glossary:

- EFI (Extensible Firmware Interface);
- UEFI (Unified Extensible Firmware Interface), supercedes the BIOS (Basic Input/Output System code) in computers newer than ~8 years ago.
- TPM (Trusted Platform Module) technology is designed to provide hardware-based, security-related functions. A TPM chip is a secure crypto-processor that is designed to carry out cryptographic operations. The chip includes multiple physical security mechanisms to make it tamper resistant, and malicious software is unable to tamper with the security functions of the TPM.[12]

Glossary, continued:

- VBS (Virtualization-based Security): Hardware virtualization features to create and isolate a secure region of memory from the normal operating system. Windows can use this "virtual secure mode" to host a number of security solutions, providing greatly increased protection from vulnerabilities in the operating system, and deflecting malicious exploits that attempt to defeat protections.[11]

- UEFI-MAT (UEFI v2.6 Memory Attributes Table (MAT)) - To ensure compatibility with VBS, firmware must cleanly separate EFI runtime memory ranges for code and data, and report this to the operating system. Proper segregation and reporting of EFI runtime memory ranges allows VBS to apply the necessary page protections to EFI runtime services code pages within the VBS secure region.[11]

List of Downloadable Online AV Scanners:

- ESET Online Virus Scanner (free)
  http://go.eset.com/us/online-scanner/run/

- Microsoft Safety Scanner (free)
  https://www.microsoft.com/security/scanner/en-us/default.aspx

- Trend Micro HouseCall (free) http://housecall.trendmicro.com/

Tools for Malware Removal in Difficult Cases:

Combofix http://www.bleepingcomputer.com/download/combofix/ is a malware removal tool that is extremely good at extracting difficult-to-banish malware and rootkits, malicious tools that attackers can use to burrow deep into an infected system.

If a virus scan says you have some version of "TDSS" on your system, or you have an infection that comes back no matter what tools you use, try TDSSkiller, http://www.bleepingcomputer.com/download/tdsskiller/.

Other handy removal tools include Malwarebytes and Superantispyware. If you're trying to revive a computer that won't boot, check out my article with links to resources for removing viruses from a PC that won't boot: http://krebsonsecurity.com/2010/03/removing-viruses-from-a-pc-that-wont-boot/

References:

1) https://www.pcmag.com/article2/0,2817,2455505,00.asp#disqus_thread: A review of MalwareBytes free.

2) https://www.pcmag.com/article2/0,2817,2455577,00.asp: A review of MalwareBytes Premium.

3) https://www.techradar.com/reviews/malwarebytes, a review mostly of the usability of MalwareBytes, how to navigate the choices, but does quote the test results of MRG Effitas, etc.   and a test of MalwareBytes on Android devices.

https://www.mrg-effitas.com/wp-content/uploads/2018/05/MRG-Effitas-2018Q1-360-Assessment.pdff

4) AV-Comparatives Performance Test (i.e. PC processor slowdown by Anti-malware Software):

   https://www.av-comparatives.org/tests/performance-test-october-2018

5) How-to-Geek's own strong opinion - Defender + MalwareBytes Premium.

https://www.howtogeek.com/225385/what%E2%80%99s-the-best-antivirus-for-windows-10-is-windows-defender-good-enough/

 a good summary what kind of protection is needed, with links to more good How to Geek articles.

References, continued:

6) https://www.pcmag.com/article2/0,2817,1926596,00.asp: title Microsoft Windows Defender Security Center, by Neil J. Rubenking, PCMag online, April 13, 2018. rates it 3*, good.

7) Best Malware Removal and Protection Tools, PCMag online, September 20, 2018:

https://www.pcmag.com/roundup/354226/the-best-malware-removal-and-protection-tools
by Neil Rubenking, Editor

8) https://www.pcmag.com/article2/0,2817,2496675,00.asp: How PCMag Tests anti-Virus and Security Software; for protection, malicious URL blocking, Phishing detection, and Firewall protection, and parental controls. April 6, 2018.

9) https://www.pcmag.com/roundup/353231/the-best-ransomware-protection: Summary chart and review write-ups on each product. Also discusses how you get ransomware, and the methods anti-ransomware uses to protect your PC.

10) techradar.com: two articles, on free and paid anti-ransomware.
https://www.techradar.com/news/best-paid-anti-ransomware-software
10a) https://www.techradar.com/news/the-best-free-anti-ransomware-tools

References, continued:

11) Discussion of special CPU hardware features that augment threat protection
https://docs.microsoft.com/en-us/windows-hardware/design/device-experiences/oem-vbs

12) How Windows uses the Trusted Platform Module:
https://docs.microsoft.com/en-us/windows/security/information-protection/tpm/how-windows-uses-the-tpm

13) Toms Hardware on MalwareBytes 2014:

https://www.tomsguide.com/us/malwarebytes-free,review-2204.html

14) Consumer Reports Online, "Anti-Virus Software," report date July 30, 2018.

CR Online is by paid subscription, but you can get access to it on the Minuteman

Library Network, with your library card number from any Boston area public

library, even at home over the internet.

www.carylibrary.org/e-learning-research/e-research

Scroll down to "Databases A-F" and scroll in that column to Consumer Reports

Online. Log in with your library card number.